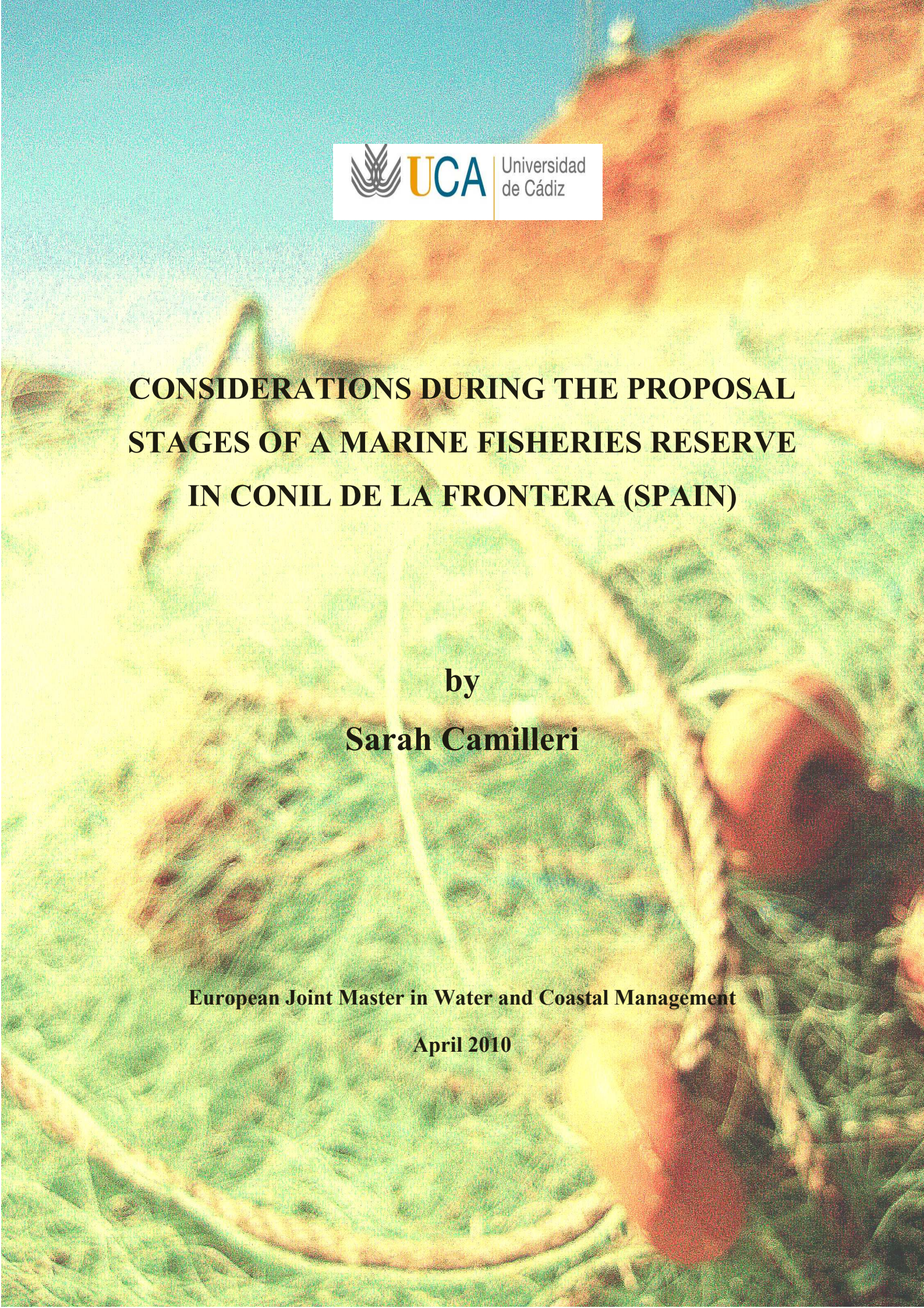

CONSIDERATIONS DURING THE PROPOSAL STAGES OF A MARINE FISHERIES RESERVE IN CONIL DE LA FRONTERA (SPAIN)

by

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European Joint Master in Water and Coastal Management

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STATEMENT

I hear by declare that this work has been carried out by me and the thesis has been composed by me and has not been submitted for any other degree or professional qualification. This work is presented to obtain a masters degree in Water and Coastal Management.

Sarah Camilleri

D. ANGEL DEL VALLS CASILLAS, Catedrático de Universidad del Departamento de Química-Física de la Universidad de Cádiz y D. David Florido del Corral, Profesor del Departamento de Antropología Social de la Universidad de Sevilla**,** como sus directores HACEN CONSTAR:

Que esta Memoria, titulada **"**Considerations during the Proposal Stages of a Marine Fisheries Reserve in Conil de la Frontera (Spain)", presentada por D. Sarah Camilleri, resume su trabajo de Tesis de Máster y, considerando que reúne todos los requisitos legales, autorizan su presentación y defensa para optar al grado de Máster en Gestión del Agua y Costera.

Cádiz, 9 de Abril 2010

Dr. Ángel Del Valls Casillas

Dr. David Florido del Corral

I dedicate this master thesis to my family in Malta and to close friends in Cadiz and elsewhere whose moral and emotional support has been of great value. My dedications also go to lands, seas and cultures encountered prior to and during the research period, for it was their charm and beauty that sparked my quest for a deeper understanding of processes and systems within.

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ABSTRACT

With the fishing sector presently going through a range of problems internationally, the creation of Marine Protected Areas (MPAs) and Marine Fishery Reserves (MFRs) is a choice in which various fisheries, environmental and research groups are showing a stronger belief. Within such systems, conventional measures are replaced by an 'ecosystem-approach' and stakeholder participation is considered fundamental. This investigation takes a look at the internal workings as well as external influences during the development of initiatives for the creation of such a MFR around an artisanal fishing port found on the south-west Atlantic coast of Spain, precisely, Conil de la Frontera. Attendance to related events, networking to gain access to key information and informants and participation in directly or indirectly linked projects uncover the fields to be explored and provide the required data. A detailed look is taken at initiatives to implement bottom-up management in Conil following steps of MFR creation through the same management approach in Galicia, which here takes the role of the 'control' case-study. Details of views of the fishing sector towards such initiatives are revealed, together with zonation plans and the strengths, weaknesses, threats and opportunities of the sector, whilst facing this new venture, are uncovered. Additionally presently involved stakeholders, and others with probable future relevance were analyzed through the study of their historical and current roles and responsibilities. Finally, themes which were found to be linked to the area proposed for the MFR creation and which could form part of, or influence the system within the reserve, were investigated. These included: illegal/pirate fishing activities, projects of 'offshore' wind farms, the controversial Bluefin Tuna issue, Aquaculture and Fishing Tourism. The final analysis of the results acquired lead to the conclusion that in sight of the new challenges which the fishing sector will have to face, insecurities are based on the scenario being shared by more stakeholders and moreover being influenced by higher level, foreign authorities. For this, an adaptive and updating outlook of the MFR Committee/Managing team is advised. Mistrust between participants is pointed out as another major weakness, which may be reduced if groups are well represented within the management team or efficiently communicated with it. Diversity and objectivity are other suggested qualities to mitigate mistrust and conflicts. On the other hand, the traditional setting and cultural heritage inspires confidence within the sector and this in awarded by support by various other groups based on the recognition of this heritage, and also of the 'local ecological knowledge'. Adaptation of institutions, to the novel management philosophy is also deemed essential. Meanwhile 'recreational' fishermen, especially the underwater type, seem to be found in a precarious position and creativity and innovation is called for to design inclusive plans rather than exclusive ones. As for real damaging activities, control through team effort by all users on field is called for. As for the faiths of future ventures as is aquaculture, offshore wind farming and fishing tourism, these depend on their results with respect to environmental sustainability and economic feasibility, and also on decisions at higher levels. Within its limits, this investigation aims as serving as a memoire and management tool for future managers of MFRs in Conil and elsewhere.

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Hypothesis

Strengthening locally based management through a bottom-up approach, networking and larger-scale considerations may provide a solid information base prior to the creation of a Marine Fisheries Reserve.

Aim of the work

This study aimed at acquiring a much needed bird's eye view of the situation prior to the possible creation a Marine Fisheries Reserve in Conil de la Frontera, in the south-west of Spain, for the building of the base information prior to further steps. Knowledge acquired through such an approach would then serve as the support information prior to future stages and decisions under the responsibility of the management team.

The investigation was multi-targeted focusing on:

- Exploring existing examples of the bottom-up approach applied in the creation, monitoring and managing phases of Marine Fisheries Reserve, as well as following the employment of this principle in Conil de la Frontera during the proposal stages of the reserve.
- Identifying relevant users and stakeholders and uncovering their positions, viewpoints in the context of the creation of the reserve.
- Exposing and exploring local and global issues of relevance to the area projected for the creation of the reserve.

CHAPTER 1

GENERAL INTRODUCTION

1.1. The State of Fisheries Nowadays

The state of fisheries worldwide seems to be one of alarm. Catches and fish sizes are smaller than ever, job opportunities and interest in the sector less and the average age in the sector is getting older, and if it weren't for subsidies a considerable part of the sector would no longer be running. Additionally the industry is more divided than ever, on one hand the working power is greater thanks to technological advances and illegal activity (European Commission, 2009) and on the other hand small-scale artisanal fishermen are victims of harsher competition in poorer seas (Garcia Allut & Jesus, 2009). Some blame the science backing this activity; others claim that management objectives and policies are either wrong or applied ineffectively and further issues affecting the marine ecosystems, are also said to be influential but not given sufficient importance (Callum, 2007).

Action to deal with circumstances of these kind are multidirectional and of various scales. On one hand there is pressure to act at national and international levels so as to create effective management plans. On the other end of the line, action is also present at regional and local levels as an attempt to conserve local knowledge and practices and create culturally compatible policies within limits set by the larger scale plans.

1.2. Marine Reserves and Networks: A Possible Solution

With a greater range of anthropogenic activities in coastal areas and further out, and a call for better integrated management[1]; creating officially protected marine areas under a set of pre-determined regulations and agreements is a more-common-than-ever option. In Spain alone we nowadays find 38 Marine Protected Areas (MPAs) of which only 13 are properly marine (the rest being partly coastal and partly terrestrial). Of these 13, only 4 conform to the Network of National Parks i.e. including a marine or coastal zone of up to a maximum of 1 nautical mile (WWF, 2009). Additionally we find a total of 12 Marine Fisheries Reserves (MFRs) which primarily focus on protecting commercial species and important fishing grounds (WWF, 2009 & RIRM, 2009). And there is definitely a current tendency to keep this figure rising. According to the United Nations Conventions on Biological Diversity, as one of the means to stop the loss of the global biological diversity, in 2012 all countries should have protected at least 10% of the big marine biomasses. However the present figure is still a far cry from this target, with Oceana (2008) having calculated that, taking into consideration waters falling under Spanish jurisdiction alone, an average of 0.5% of the marine surface is currently protected. Oceana has thus made a proposal of 25 areas for protection as well as an increase in size of the existing ones.

The lesser number of reserves which focus on fishery management when compared to general MPAs is a reflection of the historical pattern where an MPA was originally used for the protection of landscapes/seascapes for recreation. More recently resource management has

[1] A more integrated approach is advocated by the Integrated Maritime Policy and its environmental pillar, the Marine Strategy Framework Directive (Directive 2008/56/EC) (European Commission, 2009).

taken a more significant role and closed areas and harvest refugia (more officially, Marine Fisheries Reserves[2], MFRs) are increasingly popular amongst the portfolio of options available to marine resource managers, largely because conventional measures for managing fisheries and conserving marine ecosystems have repeatedly failed. Whilst limiting fisheries management to controls on quantity of effort or catch ignores the potentially significant impact that fisheries activities have on ecosystems and their function, the use of spatial, temporal and further regulations, made possible by area closures, ensures that the benefits of management are extended beyond just the target stock to wider segments of ecosystems themselves moving fisheries management away from the species-by-species system (based on TACs and MSYs[3], disregarding the environment in which target fish species live and paying no attention to discard, by-catch and by-kill) to more ecosystem-based conservation (Agardy, 2000).

Benefits observed in such areas include ecological as well as sociological ones. They protect fish from capture, allowing them live longer and grow larger, and since big fish produce many times more offspring, populations in well-protected areas spawn at higher rates. Then when fish populations rise, they seek less crowded areas and move from reserves to fishing grounds. This raises baseline population sizes and allows the development of natural age structures which restores resilience. Habitats and more vulnerable species are better taken care of too (Callum, 2007) and additionally there is spill-over, that is, neighbouring zones benefit too (Agardy, 2000). On a social level MPAs and MFRs can provide an effective framework to empower resource users through shared governance arrangements, generation of new opportunities and recognition of local ecological knowledge and cultural identity (Garcia Allut & Jesus, 2009).

Francis et al. (2007) have defined the 10 commandments for this new ecosystem approach:
" 1. Keep a perspective that is holistic, risk-adverse and adaptive.
2. Question every assumption, no matter how basic it is or what the conventional wisdom suggests.
3. Maintain an "old growth" structure in fish populations, since big, old and fat female fish have been shown to be the best spawners, but are also susceptible to overfishing.
4. Characterize and maintain the natural spatial structure of fish stocks, so that management boundaries match natural boundaries in the sea.
5. Monitor and maintain seafloor habitats to make sure fish have food and shelter.
6. Maintain resilient ecosystems that are able to withstand occasional shocks.
7. Identify and maintain critical food-web connections, including predators and forage species.
8. Adapt to ecosystem changes through time, both short-term and on longer cycles of decades or centuries, including global climate change.

[2] Such protected areas fall under Category VI 'Protected area with Sustainable Use of Natural Resources' of the IUCN classification (Garcia Allut & Jesus, 2009).

[3] Total Allowable Catches and Maximum Sustainable Yields

9 Account for evolutionary changes caused by fishing, which tends to remove large, older fish.

10. Include the actions of humans and their social and economic systems in all ecological equations. ”

Despite criticism to this approach, which as Murawski (2007) claims, may be propagated to protect certain sectorial interests, management ‘best practice’ guidelines, as the above ten, are emerging. There however still lacks more solid scientific feedback, cumulative ecological and economical results and more official ‘rules of engagement amongst sectors’. Murawski`s (2007) analysis of the myths and criticisms surrounding the ‘ecosystem approach to management’, concluded with the idea that this approach will be eventually ‘subsumed into ocean resource management and will cease to be a point of debate’.

1.3. Stakeholder Empowered Participation

The human element in marine protected areas must not be understated and the success of any protected area is closely related to how well user groups and stakeholders are identified and brought into the planning and management processes. Such areas may not afford to be elitist and must be instead seen, by all involved stakeholders, as a beneficial tool for promoting effective management (Agardy, 2000). Infact amongst the best practices for the planning and implementing MPAs, stated by the IUCN, is the encouragement of stakeholder participation stated to promote information exchange and accountability of experts and authorities, reduce mistrust in the decision-making process, and enable stakeholder groups to collaborate and find mutually acceptable solutions. A further plus of stakeholder participation is that it fosters a sense of ownership and accomplishment among the groups involved, thereby strengthening support and political will. Local community meetings led by traditional leaders, government-sponsored opportunities for information sharing and inter-governmental planning meetings are useful tools for practicing this philosophy (WCPA/IUCN, 2007).

Increased stakeholder participation is given special reference in the co-governance (co-management) paradigm which is becoming ever more popular and which refers to distribution of responsibilities between government authorities and the various components of the fisheries sector. This system is claimed to be more democratic, allowing participation by a wider range of citizens; as well as more efficient, reducing implementation costs and reaching better levels of acceptance of policies by users, when these have formed part of the decision process. Its accommodation and application, however, requires (i) a change in the cognitive base of the management paradigm integrating scientific knowledge, management objectives and in this case, fishermen experiences; (ii) restructuring institutional and organization agreements/policies to accommodate a more participative system and; (iii) the introduction of different political administrative levels to support this paradigm. The objectives of such a system include the principles emphasized by the TACIRE (Transparent/ Accountable/ Comprehensive/Inclusive/ Representative/Informed/ Empowered) approach. Considering all likely obstacles, the application of such a system, especially in areas where it is novel, must be seen as a learning process (Florido del Corral, 2007).

In some systems the implementation of stakeholder participation takes a step further through efforts to implement bottom-up management as an alternative to conventional top-down fisheries policies which have 'failed to deliver sustainability, encouraged non-compliance among resource users, and invested substantial resources in inefficient enforcement mechanisms' (Garcia Allut & Jesus, 2009). This means that a major part of the decision-making is transferred from authorities who are usually only superficially linked with the local situation; to the workers on field themselves, in this case, the artisanal fishermen. Thus this stakeholder group is not only encouraged to participate but also to start seeing itself as a pillar of the managing team, being influential in every stage of the decision making process. This means that the role of the artisanal fisherman is re-invented: his needs and priorities are importantly considered and his experience and ecological knowledge truly valued through the shared governance of marine and coastal resources (Garcia Allut & Jesus, 2009).

To all this, we must not omit the trap of the 'participation-paradox' whereby 'greater devolution does not necessarily result in greater participation, (a claim that has contributed to the processes of devolution being overvalued)' and whereby within a more complex stakeholder network the possible positive outcomes of stakeholder participation, co-governance, bottom-up management and other pro-devolution ideals run the risk of being only mere 'discourse rather than real political interventional praxis for the fisheries crisis', as a result of which it is the most traditional of sectors, fishermen in this case, that are least strengthened (Suarez de Vivero, et al., 2008).

1.4. A multi-levelled socio-cultural and economic setting

The 2007 IUCN guide mentioned above also makes reference to the importance of the integration of a marine reserve into the economic and socio-cultural setting. For this reason the uncovering of current trends and aspirations present at all levels (local, regional, national and European) is vital prior to creating plans for successful and effective reserve creation. Such data integration is inevitable and fundamental due to the high density of economic and political flows that cross local territories and societies (Van Ginkel, 1999).

1.5. Bibliography

Agardy, T. (2000). Information needs for marine protected areas: Scientific and Societal. Bulletin of Marine Science, 66(3): 875–888

Callum, R. (2007). The Unnatural History of the Sea. Washingthon, D.C.: Island Press

European Commission (2009) GREEN PAPER Reform of the Common Fisheries Policy [online] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0163:FIN:EN:PDF Accessed on: 18/11/09

Florido del Corral, D. (2007). Challenges and responses in fisheries management systems: The case of artisanal fleets of the Atlantic coast of Andalucia. In: Rubio-Ardanaz, J.A. & Erkoreka, A. (Eds). Cultura y Sociedades marítimas: prácticas específicas, sistemas técnicos, sociales y de representación. Zainak. 29, 2007, 101-122.

Francis R.C., Hixon, M.A., Clarke M.E., Murawski, S.A. & Ralston, S. (2007). Ten commandments for ecosystem-based fisheries scientists. Proceedings of Coastal Zone 07, Portland, Oregon

Garcia Allut, A. & Jesus, A. (2009). Becoming Proactive Agents. Samudra, Triannual Report of ICSF (53): 15-18

Murawski, S.A. (2007). Ten myths concerning ecosystem approaches to marine resource management. Marine Policy, 31, p. 681-690

Oceana (2008). Propuesta de áreas marinas de importancia ecológica: Atlántico Sur y Mediterráneo español. [online] Available at: http://na.oceana.org/sites/default/files/o/fileadmin/oceana/uploads/europe/reports/propuesta_areas_marinas_importancia_ecologica.pdf Accessed on: 09/01/10

RIRM (2009). Red Iberoamericana de Reservas Marinas, News: Galicia crea una nueva reserva marina en la Ría de Cedeira [online]. Available: http://www.reservasmarinas.net/rmarinasnews/not.ashx?n=6000000486 [date accessed: 08/01/10]

Suarez de Vivero, J.L., Rodrıguez Mateos, J.C., Florido del Corral, D. (2008) The paradox of public participation in fisheries governance. The rising number of actors and the devolution process. Marine Policy, 32. p.319–325

WCPA/IUCN. (2007). Establishing networks of marine protected areas: A guide for developing national and regional capacity for building MPA networks. Non-technical summary report.

WWF (2009). Falta de Áreas Marinas Protegidas. [online] Available at: http://www.wwf.es/que_hacemos/mares_y_costas/problemas/falta_de_areas_marinas_protegidas/ Accessed on: 09/01/10

CHAPTER 2

METHODOLOGY

2.1. Introduction to locations

Figure 1. Edited illustration showing locations and photos of the ports at Lira and Conil de la Frontera (References: Lira Fishing Cooperative (2009), Google Earth (2010) & own photos.)

The existing Marine Fisheries Reserve (MFR) of greatest relevance in this study is that found in the northern Spanish region of Galicia, i.e. that of Os Miñarzos in Lira created in 2007 (RIRM, 2009). Galicia, in northwest of Spain is a region where small-scale artisanal fisheries have a great social, economic and cultural significance with 5,565 fishing vessels and 25,756 registered fishermen, out of a population of 2,750,985, being recorded in 2004 (Garcia Allut & Jesus, 2009). In this study the Os Miñarzos reserve has been utilized as the control site.

Meanwhile, most of the field work was based in Conil de la Frontera (short: Conil), on the southwest Atlantic coast of Spain, within the region of Andalucia and the province of Cadiz. Here efforts for the creation of a MFR commenced only recently in 2009. Andalucia is another region where artisanal fishing has held a strong position consisting of 633 fishing vessels (40.7% of the total of fishing vessels landing catches in Andalucia). The fleet in Conil in particular, consisting of around 70 boats is solely of the artisanal type[4] and the village`s

[4] Andalucian artisanal fleets comprise of small fishing vessels with a tonnage of less than 20 GRT (Gross Register Tonnage), and that embark on daily fishing trips within fishing grounds proximate to the base ports. Other fleets include: the Deepwater and Ocean-going Fleets, working outside national fishing grounds, with a tonnage exceeding 100 GRT and 250 GRT, respectively, that undertake industrial activity with appropriate mechanisation of fishing tasks and product preparation; and the coastal or Shallow-water Fleet, working waters under Spanish jurisdiction or closed fishing grounds, with a tonnage between 20 and 100 GRT, that carry out a primary industrial activity (Piniella *et al*., 2007)

fishing grounds are shared by the fleets of the neighbouring villages of Sancti Petri and Barbate (also members of Conil`s Fishing Cooperative) (Consejería de Agricultura y Pesca de Andalucía, 2005 & 2008).

2.2. Data Collection

The multi-directional nature of this qualitative study meant that multiple approaches had to be employed in order to gather the required information from a diverse range of sources. Whilst a passive outlook was applied at the primary stages, a more interactive and collaborative standpoint was deemed an essential key for perceiving and gaining access to the information required. The approaches taken include the following:

(i) Attending Stakeholder Workshops and Meetings

Attending such activities served as a good introduction to some of the main stakeholder groups, local terminology, dominant local and national issues of influence to the fishing sector, as well as on-going and future related projects. Such occasions also served for the direct observation of the type of management processes and stakeholder interaction taking place in the proposal formulation stages of a MFR. The participation to these meetings may be seen as the passive stage of the study. This included:

- A two day encounter under the name of 'Days about Fishing, Commercialization and Marine Fisheries Reserves' during which stakeholders discussed the main current issues regarding the management, exploitation and commercialization of fishing resources globally, with special reference to the province of Cadiz.

- Workshop sessions principally led by members of the Conil de la Frontera Fishing Cooperative , which served for the discussion of management and zonation details of the future MFR in Conil and information transfer from experiences of other reserves

- A series of meetings of various scales with members of the involved ecologist group (*Ecologistas en Acción*). Examining this group's perspective was seen as beneficial since it has been active in the region of Cadiz for many years, is also active with respect to national and international fishery issues through studies and campaigns and is one of the main pressure groups working for the implementation of the reserve in Conil.

Attendance was also deemed beneficial for gaining access to further information collected by other participating researchers. Such additional information included data from:

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- Questionnaires designed and applied by a research group employed by the Conil de la Frontera Fishing Cooperative, targeted at allowing a closer look at the perceptions of the fishing community of Conil with respect to the creation of a MFR.

- Zonation maps formulated through a collaborative effort between fishermen who indicated the important zones and researchers who assisted during the map design process.

- Valuable base information collected by members of the ecologist group through years of experience on a range of themes relevant to fisheries in the region

(ii) One-to-one interviews

Upon highlighting the main objectives to be met and the main themes to be investigated, key informants in the diverse analysed fields were identified and a series of one-to-one interviews followed. Interviews were held during personal meetings, through phone calls or through e-mail. These key informants included:

- Fishermen and ex-fishermen from Conil de la Frontera and other members of the Cooperative
- Members of the Conil de la Frontera Nautical Club
- Members of the Galician Regional Council with links to the Os Miñarzos MFR
- Members of the active Ecologist group (*Ecologistas en Acción*)
- Anthropologists with experience in socio-cultural themes with links to fisheries in the region
- Researchers working on the proposal of the MFR in Conil de la Frontera

Interviewees were located though so-called hyper-networking, a multi-level method based on affiliation between entities at different levels, such as the affiliation between a cooperative, club or organization and individuals engaged in them. Further on, within each group, a snowball effect was generated, whereby existing study subjects suggest further subjects from among their acquaintances (Katz, 2006). The use of these methods is justified by the fact that the aim was not to collect a representative sample but rather to acquire a general picture of the situation in an inexpensive manner. Additionally, in some cases, the informality of this technique was observed to facilitate data access in situations where formal questionnaires could inhibit open and sincere communication.

(iii) Voluntary Project Participation

- Participating in projects of organizations linked directly or indirectly to the fishing sector in Conil and at larger scales served as a good source of secondary but relevant information. These included:
- Participation within projects and attendance of meetings related to fisheries in other Mediterranean locations, allowing insight to general trends.

- Collaboration with *Ecologistas en Acción* with work related to reviewing the European Commission's 'Green Paper on a reform of the Common Fisheries Policy' and formulating proposals for the development of the future Common Fisheries Policy. This allowed this study to take a look at local and supra-local social processes.
- Use of questionnaires forming part of a European Union funded project run by researchers from Dalhousie University and the Institute of Marine Sciences in Barcelona. This qualitative questionnaire was designed to obtain information about the marine ecosystem and improve the understanding of the fishing crisis through direct contact with fishermen and other people working in direct contact with the sea.

2.3. Data Organization

Collected information was organized under the following headings:

→ 'Management Analysis' including the:
- step-by-step description of the management procedure development at Os Miñarzos
- description of the preliminary stages of the same procedure in Conil, up to the reached stage
- analysis of questionnaires uncovering earliest views of the fishing community at Conil, with respect to the reserve.
- presentation and description of proposed Zonation Map
- SWOT analysis of information gathered in diverse manners, during these preliminary management stages in Conil

→ 'Stakeholder Identification and Analysis' including the:
- identification of stakeholders that were already directly or indirectly part of the management process for the MFR creation at Conil or that are situated within the territory involved or that could possibly be involved later.
- description of the identified stakeholders, highlighting their roles and perspectives and linked relevant historical events, conflicts and more

→ 'Further Selected Highlights' including a general overview of themes related to the location under consideration.

Results collected under these groups, were then analyzed for the formulation of management guidelines and suggestions.

2.4. Bibliography

Lira Fishing Cooperative (2009) Un proyecto de desarrollo sostenible: Construyendo el Futuro. Presentation at Conil de la Frontera, 19th June 2009.

Consejería de Agricultura y Pesca de Andalucía (2005). Estadística Pesquera: Conil de la Frontera (Cádiz): 1992-2003. Consejería de Agricultura y Pesca. Publica: Viciconsejeria: Servicio de Publicaciones y Divulgación.

Consejería de Agricultura y Pesca de Andalucía (2008) Producción Pesquera Andaluza Año 2008. [online] Available at: http://www.juntadeandalucia.es/agriculturaypesca/portal/opencms/portal/DGPesca/produccionpesquerandaluza2006?entrada=tematica&tematica=272&subtematica=561 Accessed on: 29/01/01

Garcia Allut, A. & Jesus, A. (2009). Becoming Proactive Agents. Samudra, Triannual Report of the ICSF (53): 15-18

Google Earth (2009) [online] Available at: earth.google.es Accessed on: 28/01/10

Katz, H. (2006). Global surveys or multi-national surveys? On sampling for global surveys. Thoughts for the Globalization and Social Science Data Workshop, UCSB, November 9, 2006 [online] Available at: www.global.ucsb.edu/.../Katz_for-UCSB-data-workshop.doc Accessed on: 12/01/10

Piniella, F., Sorgiguer, M.C. & Fernandez-Engo, M.A. (2007) Artisanal fishing in Andalusia: A statistical study of the fleet. Marine Policy 31 (2007) 573–581

RIRM (2009). Red Iberoamericana de Reservas Marinas, News: Galicia crea una nueva reserva marina en la Ría de Cedeira [online]. Available: http://www.reservasmarinas.net/rmarinasnews/not.ashx?n=6000000486 Accessed on: 08/01/10

CHAPTER 3

MANAGEMENT ANALYSIS

3.1. Control Case Study: Bottom-up Management at Os Miñarzos Marine Fisheries Reserve (MFR)

The bottom-up implementation of MFRs in Galicia, to promote the sustainable co-management of small-scale fisheries alongside biodiversity conservation, was initiated in 2003, through the implementation of the Os Miñarzos in Lira, led by local fishermen's organizations. In the same region the Ría de Cedeira MPA has been the second of its kind to be decreed in Galicia, at the start of 2009, followed by five other initiatives – Aguiño; Muros; Camelle; Cedeira, Cariño, Espasante and O Barqueiro; and O Celeiro—all of which are currently in the design stage (Garcia Allut & Jesus, 2009). Table 1 is a summarized account of the fundamental stages and the supporting data and actions behind the creation process of the Os Miñarzos MFR.

Table 1 Account of Bottom-up Management Implementation at Os Miñarzos MFR (References: Cofradia de Pescadores Lira (2009), García Allut & Jesus (2009), Marine and Fisheries Resource Group, A Coruña University (2007))

TIMELINE	RESERVE CREATION AND SUPPORT METHOD	DATA COLLECTED/ ACTIVITIES HELD
November 2003 Beginning of formulation of proposal **July-August 2004** Beginning of Resource Evaluation	**Primary Debating Stage:** Debate Workshops between fishing community members, scientists, administration officials, NGO members etc. **Design Stage:** Proposal elaboration by elected Committee of Representatives (directors, fishermen, scientists). Periodic meetings of this Committee establishing efficient communication and information channels among resource users to enhance their participation during the whole process; and identification of the main features influencing MFR design and planning. Beginning of data collection Information integration in a geographical information system (GIS) database as the basis of decisions on the MFR location, size, shape and zoning, resource use and conservation	**Fishermen** contributed to characterize the area in terms of resource uses and users, threats, conflicts, most productive fishing grounds, annual fishing cycles, species life cycles, key habitats etc. **Scientists and technicians** contributed to: • Study of abundance and structure of biological communities (benthonic and demersal flora and fauna) through hydroacoustics, diving operations, sampling and laboratory analysis. • Supply of bathymetry, topography, satellite imagery, aerial photography, oceanographic conditions

TIMELINE	RESERVE CREATION AND SUPPORT METHOD	DATA COLLECTED/ ACTIVITIES HELD
July 2004 Approval of Proposal **September 2004** Proposal presentation to Autonomous Government of Galicia **July-August 2005** Continuation of Resource Evaluation	**Planning and Management Stage:** Formulation of a Preliminary Management Plan defining long-term goals, identifying and prioritizing management needs, and proposing regulatory measures in the previously identified management zones (no-take zones, special protection zones and use zones). Other points of discussion at this stage include: fishing rights allocation, biological and social monitoring, capacity building, performance evaluation, surveillance and enforcement, funding and self-financing, and the functioning of the co-management body. Further data integration within the GIS **General Assembly** with the rest of the fishing community to legitimize the proposal elaborated by the Committee of Representatives; followed by submission.	**Regulatory measures** included: restrictions on recreational and commercial fishing on the type of gear and the number of devices per vessel or fisherman, catch limits, minimum landing sizes, and seasonal closures. **Protocols designed**, to monitor fishery activities (through inspection) and environment for evaluation of the effects of the reserve in the protected areas and the adjacent ones too, through pilot studies. Data collected includes: effort, capture, spatial localization, and daily data per boat and per catch.
May 2007 Approval of Decree **December 2007** Establishment of control services within reserve	The creation of the reserve was technically supported by the Lonxanet Foundation for Sustainable Management and subsequently financial and legal support arrived from the Autonomous Government of Galicia	
2007 until present	The reserve is supported by a collaborative effort between the Fishing Cooperative of Lira, WWF/Adena, Lonxanet Foundation and Galician Universities.	This effort includes: biological and sociological monitoring, participative workshops, management and control proposals, identification of fisheries eligible to MSC[5] certification, sustainable fishing and communication campaign and voluntary activities.

[5] The Marine Stewardship Council refers to a world leading certification and eco-labelling program for sustainable seafood (Marine Steward Ship Council, 2009)

TIMELINE	RESERVE CREATION AND SUPPORT METHOD	DATA COLLECTED/ ACTIVITIES HELD
	Projects stemming from the creation of the reserve have been of three kinds: **Economic…**	▪ New infrastructures and services ▪ New system of direct commercialization (LONXANET) ▪ Sale point at Mercado San Miguel (Madrid) ▪ Constitution of a Cooperative of Women Shellfish Collectors ▪ Product promotion (Network of Restaurants for Sea Conservation, Cooking Workshops)
	…Socio Economic…	▪ MARDELIRA Projects (Fishing Workshops, Fishing Tourism, Sustainable Recreational Fishing) ▪ Participation in European Union Projects (SEREA, SEAWOMEN, IMEC, SEREA, FISHERNET) ▪ Participation in Artisanal Fishermen Networks (RECOPADES)
	…and Biological/Ecological	▪ Eco-diving and Submarine Photography Competitions ▪ Summer Courses about Marine Reserves ▪ Information Points
	Further actions for the popularization of the reserve	Visits, promotion through radio and T.V., participation in forums, conferences etc.

The results observed in the area of the Os Miñarzos include a notable reduction in illegal activities and an improved situation for the so-called *percebeiros* (barnacle fishermen). The rest of the fishing sector has still not experience a considerable improvement with regards to

production and commercialization. As for vigilance and control, stricter action is still said to be needed. Meanwhile a certain level of scepticism still lingers on. On a more positive note the local economy tied to activities within the reserve is of a more dynamic nature (Cofradia de Pescadores Lira, 2009).

3.2. Application of the Bottom-up Management Model at Conil de la Frontera: Results so far

Examples of locally enforced initiatives by small-scale artisanal fishermen are not novel at Conil de la Frontera. In this small village, fishing activity may be traced way back to the times of the Phoenicians. Examples of local initiatives are perhaps best documented since the existence of a Fishing Cooperative. Examples include the contribution of the fishing sector and supporting residents in the funding and creation of anti-trawling reefs to protect their fishing grounds as well as proposals of management and zonation plans in favour of hook tackle (Florido del Corral, 2010).

Naturally the negative trends that have hit the sector globally have also reached this corner of the world, as demonstrated by the following example (Figure 2.) of catch and value fluctuations with respect to almadraba[6] catches of Bluefin Tuna in Andalucia.

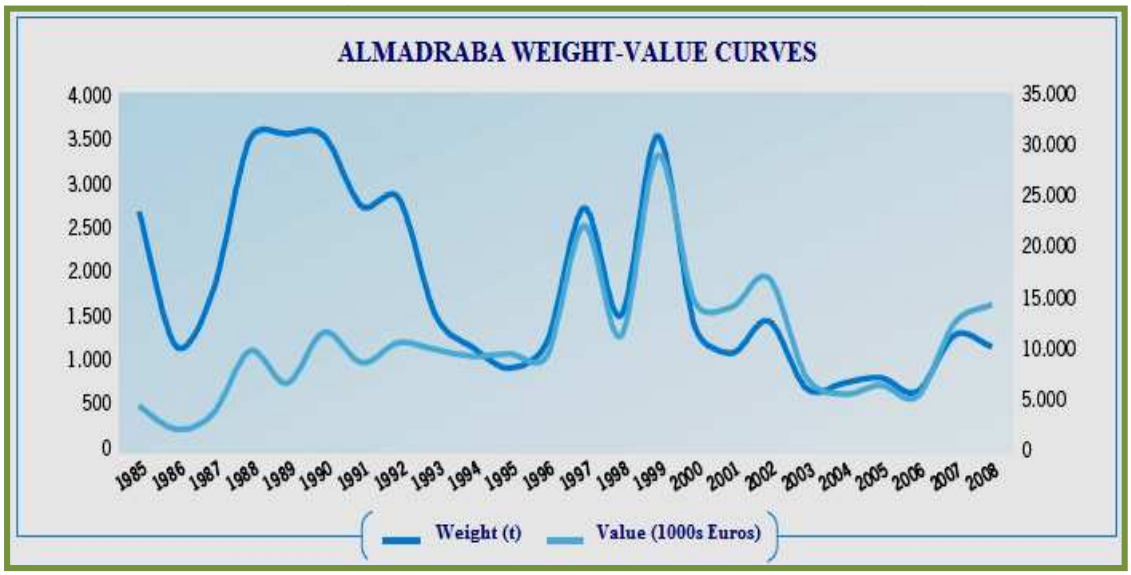


Figure 2. Fluctuations of catch (tones, left y-axis) and value (1000s of Euros, right y-axis) of the Almadraba since 1985. (Reference: Consejeria de Agricultura y Pesca de Andalucia, 2008)

In this context the small-scale artisanal fishermen, least equipped to compete for the more-than-ever scarce resources, may be the most threatened of the sector. During interviews with fishermen in the port of Conil, fears of Cooperatives losing power and funding were expressed and such situations were claimed to be an attack to the local community due to the traditional significance of such organizations. In the view of the fishing community, a

[6] Refer to Section 4.2.1.

threatened community would translate into a less consolidated local sector and in the view of managers this could mean the probability of less effective control and regulation implementation. As a result of these current trends, concerned groups have risen to face this situation by strengthening the core of the fishing community through a series of actions.

During March 2009, the Conil de la Frontera Fishing Cooperative in collaboration with members of the regional section of an Ecologist organization *Ecologistas en Acción* (= 'Ecologists in Action') and the Environmental Delegation of the Provincial Deputation of Cadiz, organized the so called 'Days about Fishing, Marketing and Marine Fishery Reserves'. During two days, members of the artisanal fishing sector from Conil and surrounding villages, ecologists, scientists and other interested entities and individuals came together to discuss the main current issues regarding the management, exploitation and marketing of fishing resources globally, with special reference to the Gulf of Cadiz. In all, ten proposals were put forward. Table 2 presents a summary of these proposals classified according to the proposing group.

Table 2 Final Proposals resulting from 'Days about Fishing, Marketing and Marine Fishery Reserves' Reference: Ecologistas en Acción (2009)

RESEARCHERS	FISHING SECTOR	ECOLOGISTS
Improving fishing product marketing strategies by: Ending the oligopoly of suppliers/traders, stopping the falling prices at fish auctions/markets, favoring less intensive productive strategies and improving resource management.	**Enforcement**, by concerned administrations, against illegal fishing operations.	**Creation of the ´Independent Forum for the Sea´** under which all those interested can contribute to improve the situation of fisheries.
Revision of the level of social participation within management of fishing resources.	The **definite elimination of the use of the *tren de bolos*** and encouragement of more selective techniques.	**Request for pragmatic training within the fishing sector,** facilitating its adaptation to today's realities
	The **legal environmental protection of important breeding grounds** for species of interest for fisheries and the obligation of an Environmental Impact Assessment of all projects and industries with possible threats to these areas.	
	Support of local fish markets as a guarantee of landed fresh fish quality and control	

RESEARCHERS	FISHING SECTOR	ECOLOGISTS
	The creation of a Marine Fishery Reserve around the fishing grounds of Conil's fleet, co-managed between the local fishing Cooperative and the relevant administrations	
	Exploring the possibility of creating an Integral (no-entry/no-take) reserve zone (from Torre de Castilnovo to Cabo de Trafalgar[7]) targeted at the protection of breeding grounds	

Following, work commenced, driven by collaborative efforts of the Conil Cooperative and *Ecologistas en Acción* to encourage the realization of the proposal for the creation of a MFR around the fishing grounds of Conil`s fleet and April 2009 marked the start of the Debating, Design, Planning and Management stages, for the formulation of an official proposal which was later presented to the Regional Ministry of Agriculture and Fisheries of the Andalucian Council in November of the same year. This proposal consisted of results and information generated during these same months and during previous studies. The principle activities that took place and the results generated are described in the following sections.

3.2.1. Debate Workshops

During these sessions Cooperative members, ecologists and researchers sat around the same table to perform the following actions:

- Elect the committee of representatives. It was suggested that these members would be responsible of organizing and participating in monthly reunions and further debate workshops.
- Discuss major past and present issues to be considered within the zonation and management plans
- Listen to experiences and suggestions from the Os Miñarzos MFR representatives

Amidst discussions there were signs of doubt and insecurity amongst the members of the fishing community. Consequently the research team took charge of designing a questionnaire targeted at allowing a closer look at the perceptions, preoccupations, misunderstandings, knowledge gaps and expectations of the fishing community of Conil with respect to the future venture. Uncovering such information would subsequently allow knowledge gaps to be filled and misunderstandings to be cleared out, through future debate workshops. According to

[7] Sites along the coast of Conil de la Frontera

Himes (2007) stakeholder input, through initiatives as this one, have proved to be essential for increasing stakeholder buy-in to the management process, developing project goals and objectives and identifying appropriate management effectiveness indicators by which to measure project effectiveness; and is ultimately critical to successful management.

3.2.2. Questionnaire Result Analysis

The questionnaire was specifically directed to individuals forming part of the local fishing community, including ship-owners and sailors. It was of course stated clearly that the questionnaire was anonymous and that results would only be used for research purposes and for support of the reserve management process. Approximately 34% (75 individuals) of the fishing population was questioned. Of the interviewed sample 48 were shipowners (64% of the sample) and 27 were accompanying sailors (36% of the sample) both groups being involved in fishing operations. Only 2 of all the individuals interviewed were women and ages of the individuals questioned ranged from 18 to 57, the average age being 37.

For a better structured interpretation of the results obtained, interrelated questions were grouped under the following titles: 'General Knowledge', 'Fishing Practices', 'Economy', 'Alternative practices/Activities', and 'Management Process'.

General Knowledge

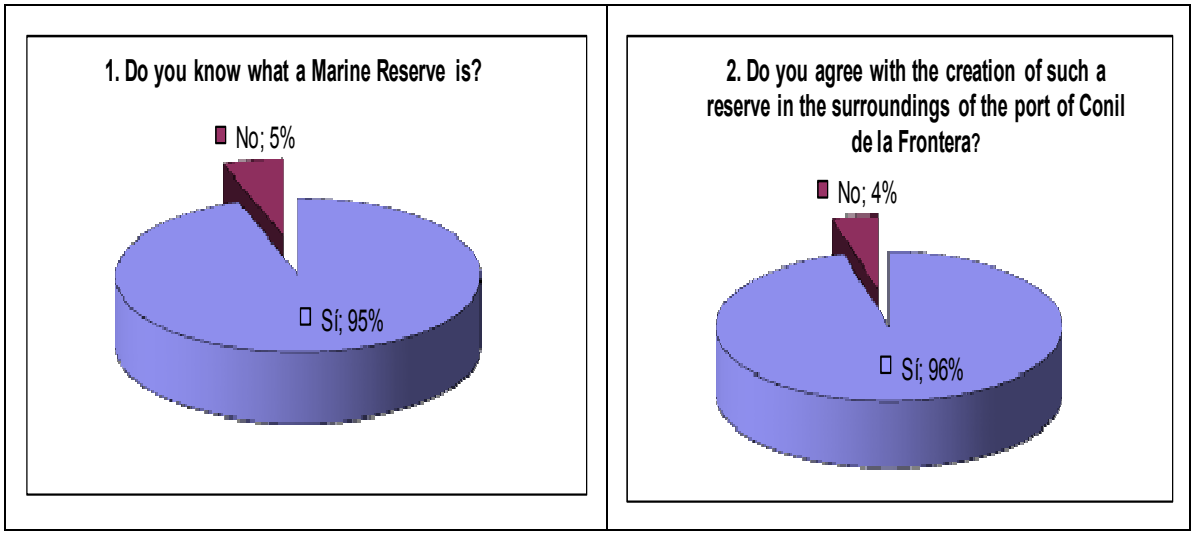


Figure 3. Results for 'General Knowledge'

A very high majority of interviewees admitted of knowing what a Marine Reserve is and believing that it should be the way forward for the area concerned. Thus informative activities held up to this point, such as the first workshop with Oz Miñarzos MFR representatives, have served to inspire confidence in such an initiative. It also indicates a major interest towards a new venture and the application of a new system, probably surging from the urgency to save the fishing industry from an ecological, social as well as an economic point of view.

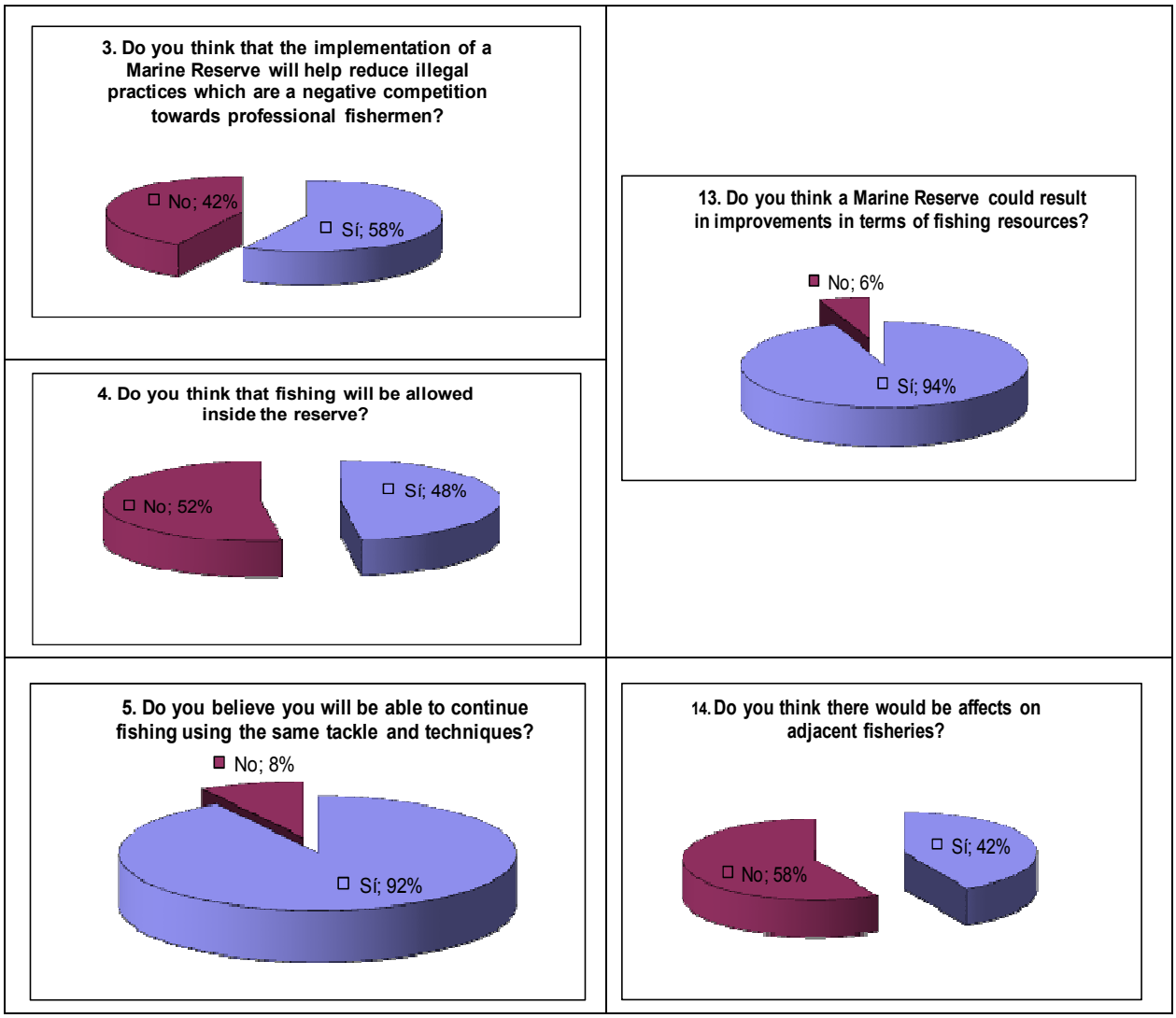
Fishing Practices

As for the situation of the future of fisheries, a mixture of doubts and hope was manifested. With regards to illegal practices, the belief that the implementation of a reserve would control illegal fishing more efficiently is still not consolidated. This can be based on various factors.
(i) Firstly it may be due to experiences from past efforts which did not prove 100% effective. Such efforts include the installation of artisanal artificial reefs - tanks filled with cement and metal rods, cement units and parts of scrapped vessels- in the zones where trawling was commonly practiced. Additionally, legally trawling is restricted to depths greater than 50m or to distances greater than 6 miles (if this depth is not reached)[8]. However this law is frequently broken owing to great knowledge of the sea bottom of fishermen (permitting them to avoid the artificial reefs) and also to the low gradient of the sea bottom in this area (Florido del Corral, 2010). So, trawling activities in protected fishing grounds are still reported nowadays remaining an ongoing cause of conflict. The reserve could act as a tool to enforce ideas as that which came up during workshops, of prohibiting or control night fishing, as this is the time when illegal and damaging trawling operations (*tren de bolos*) take place.
(ii) Next, there might still be a lack of sense of guardianship amongst the fishing community, which might be boosted once the reserve is created and if the bottom-up governance approach is applied effectively and is successful.
(iii) And to add on, illegal practices also occur on a recreational scale, the control of which might be more complex as individual actions are of a smaller scale and so, harder to control.

The results for Q4 and Q5 are contradictive. On one hand there is a level of uncertainty with regards to which practices will be allowed or banned inside the reserve. This is partly due to the fact that definite decisions are more likely to be taken at a later stage and are also subject to legislation at higher levels. On the other hand, the community expresses confidence in continued use of present practices possibly explained by the fact that Conil`s small-scale artisanal practices are positively renowned especially in the present Andalucian context characterized by a stagnation and regression of medium-range and industrial fisheries. Additionally, in Conil hook methods as the bottom-set long-line have become increasingly prioritized over others (Florido del Corral, 2010). Infact during one workshop the end to the use of traps was suggested. Hook methods, in comparison to net fishing methods, are considered as the less-damaging with respect to marine habitats, resulting in limited by-catch and ultimately giving a fresher product (Empty Oceans, Empty Nets: The Race to Save Marine Fisheries**,** 2002) and are so likely to be classified, under standards as are those of MSC as sustainable fisheries (Marine Steward Ship Council, 2009). Moreover if bottom-up governance is applied, the fishing community has a considerable influence on final decisions, including on practices permitted. It is probably for all these reasons that the majority of the fishing community has faith in the continued practice of the methods used at present.

[8] Royal Decree 632/1993

Figure 4. Results for 'Fishing Practices'



Meanwhile a major expression of belief in improvement in terms of fishing resources results from Q 13. This shows that the fishing community is well aware that careful management of fishing grounds and activities is vital. This is encouraging as it might indicate positive collaboration once reserve conditions are set and enforced. Q 14 might throw light on concerns on the fact that finally benefits might lessen if regulations are not followed by vessels originating from neighbouring villages too. Specific plans to treat problems originating from fisheries coming from neighbouring villages might be needed. Possible conflicts some of which have already been documented and others which can be speculated, include those with octopus fishermen from Sancti Petri, purse seiners from Barbate, long-liners from Algeciras and Tarifa and trawlers from Huelva, Isla Cristina, Punta Umbria, Cadiz and San Lucar de Barrameda (Florido del Corral, 2009). Meanwhile in the case of effective control of illegal operations, benefits are probable, as shown by examples as that of the creation of a network of small reserves in St. Lucia (Caribbean) increasing adjacent catches of artisanal fishers by between 46 and 90%, depending on the type of gear used; and the case in Florida where reserve zones in the Merritt Island National Wildlife Refuge have

supplied increasing numbers of world record-sized fish to adjacent recreational fisheries (Callum, *et al.*, 2001).

Economy

The answers to these questions reveal that the communities` ambivalence towards possible improvements in the economic situation through the creation of a MFR. A considerable percentage (although not the majority) belief that a Marine Reserve could result in changes in their personal economic situation and job opportunities in the fisheries sector. We suppose that these changes refer to improvements.

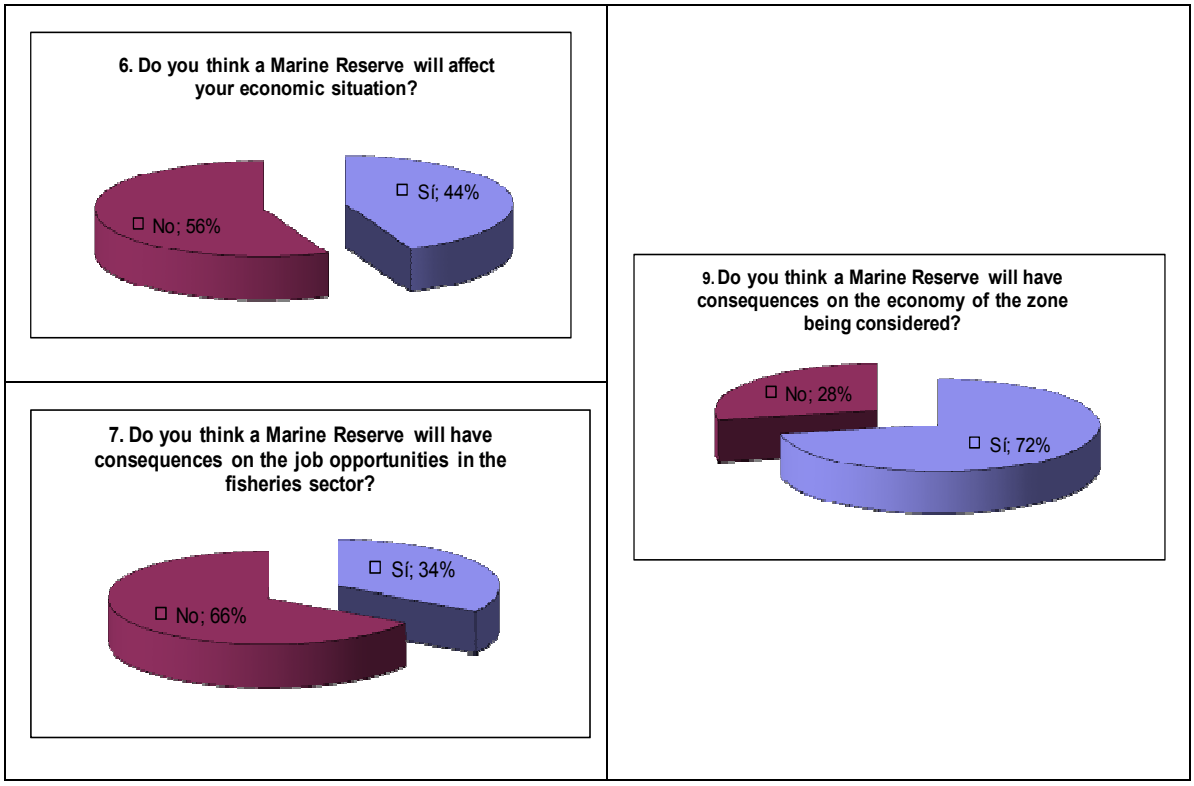


Figure 5. Results for 'Economy'

Meanwhile a greater fraction of the fishing community does not see any possible changes in terms of economy and employment. These results mirror the lingering view of artisanal fishing as a lowly profitable job but also reflect the burden of the current worrying tendencies of the fishing sector in Andalucia and elsewhere, characterised by overfishing and fleet overcapacity issues, lower catches, low economic reliance due to a trading and marketing system through which a minute percentage of what the consumer pays goes to the producer whilst the rest is lost in a complex distribution channel, reliance on heavy subsidies, volatile oil prices, marine health issues and changing trends of employment and development in coastal zones (European Commission, 2009). Figures 6 and 7 depict some details about the situation in Andalucia alone.

In contrast a large majority expressed belief that the economic situation of the zone that would be designated as a reserve would change. This might confirm that the fishing community understands that a zone designated as a protected area would possibly attract more visitors and possible innovative investments, the benefits of which would not be necessarily directed to the fishing sector alone. It might also confirm their understanding of the need of alternative future outlets (aquaculture, eco- and fishing tourism, product quality labelling etc.) to support them when fishing activity is low.

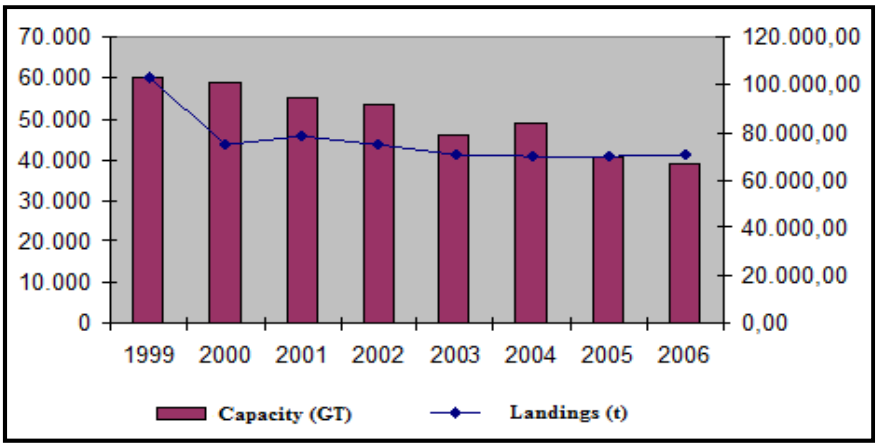


Figure 6. Edited graph showing vessel capacity in Gross Tonnage (left y-axis) and Fishery Landings (Tonnes) (right y-axis) in Andalucia from 1999 to 2006 (Reference: Florido del Corral, 2008)

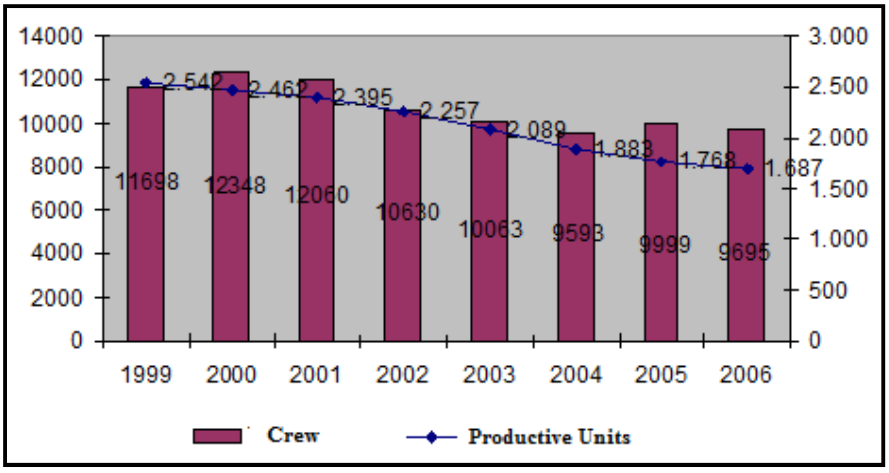


Figure 7. Edited graph showing crew numbers (left y-axis) and productive unit numbers (right y-axis) in Andalucia from 1999 to 2006 (Reference: Florido del Corral, 2008)

.

Alternative practices/Activities

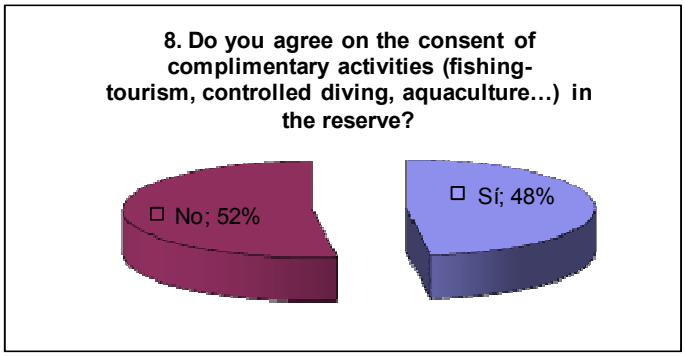


Figure 8. Results for 'Alternative Practices'

There is hesitation with regards to new activities which the fishing community might have to venture into (although the question does not distinguish between activities). Initial hostility towards novel ideas is also normal within such a close-knit and traditional setting. This hesitation towards other activities might also hold its roots in problematic episodes as that during which Conil`s Fishing Cooperative and Local Council defended the port from intentions of regional authorities to emphasize its use for nautical-recreational purposes (Florido del Corral, 2010). Hostility might also be based on past friction with other users of the port of Conil, namely recreational fishermen, details of which are accounted in Chapter 4.

Management processes

These questions where all answered with a majority affirmative response showing that in general the fishing community is supporting the Cooperative and its collaboration with other entities in their efforts for the implementation of a reserve. Thus at this early stage, there is already a good level of trust within the decision making group together with an awareness of the fact that such changes will have to undergo a long process with various obstacles to overcome, for which support from other stakeholders will be fundamental. This result is positive as the consolidation of the group from the beginning is a fundamental base which should be supported by additional information as was collected in these questionnaires. As Gomez Blanco (2009a) claims, solid group formation is important to legitimize the process from the very start to avoid serious conflicts later.

Even visitors from the Galicia Os Miñarzos Marine Reserve for Fisheries Management maintained that ‘the fishing community at Conil seems strong and settled with a background of already fulfilled projects which help to reinforce the unity between the fishermen. On the other hand the other collaborating members of the decision-making team, who are not fishermen, can be very helpful through advice. Another positive point is that the Cooperative is leaded by good will and strong leadership and initiative. This may present two sides: it may be of encouragement to the fishermen, but it may also have negative outcomes if responsibilities are not well distributed amongst the Committee and the rest of the fishing community. Moreover all should be aware that these processes are fulfilled in the long-term

as the approach adopted should be one where the fishermen use the MPA tools as a management model for sustainable fisheries, and this means a change of mentality within the fishing community. This point should be stressed, otherwise the reserve might turn out to be a classical figure of protection created by the public administrations or by environmental organizations with the risk of implementing a classical system of management which has, so far, not been so successful.' (Gomez Blanco, 2009a)

With reference to the participation of other stakeholders, sectors and organizations in the decision making process Gomes Blanco (2009b) claimed that, despite their key role as external advisors and their indispensable support in the sharing of responsibilities, as stated above, where possible, decisions should be left to the fishermen without anticipating events and decisions. As for proposal elaboration, Gomez Blanco (2009b) stated that this should be internal and confidential, that is, details should only be decided by members of the fishing community and once the document is finalized a strategy is sought to establish communication with the rest of the stakeholders.

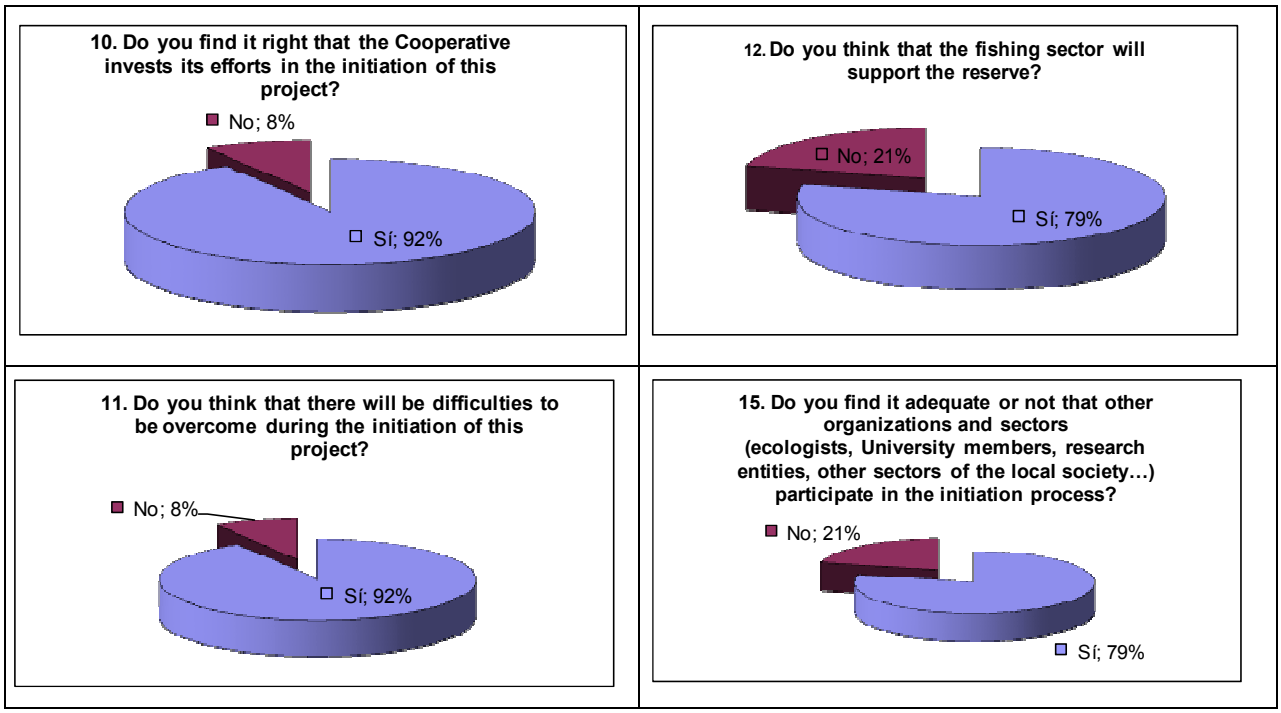


Figure 9. Results for 'Management Processes'

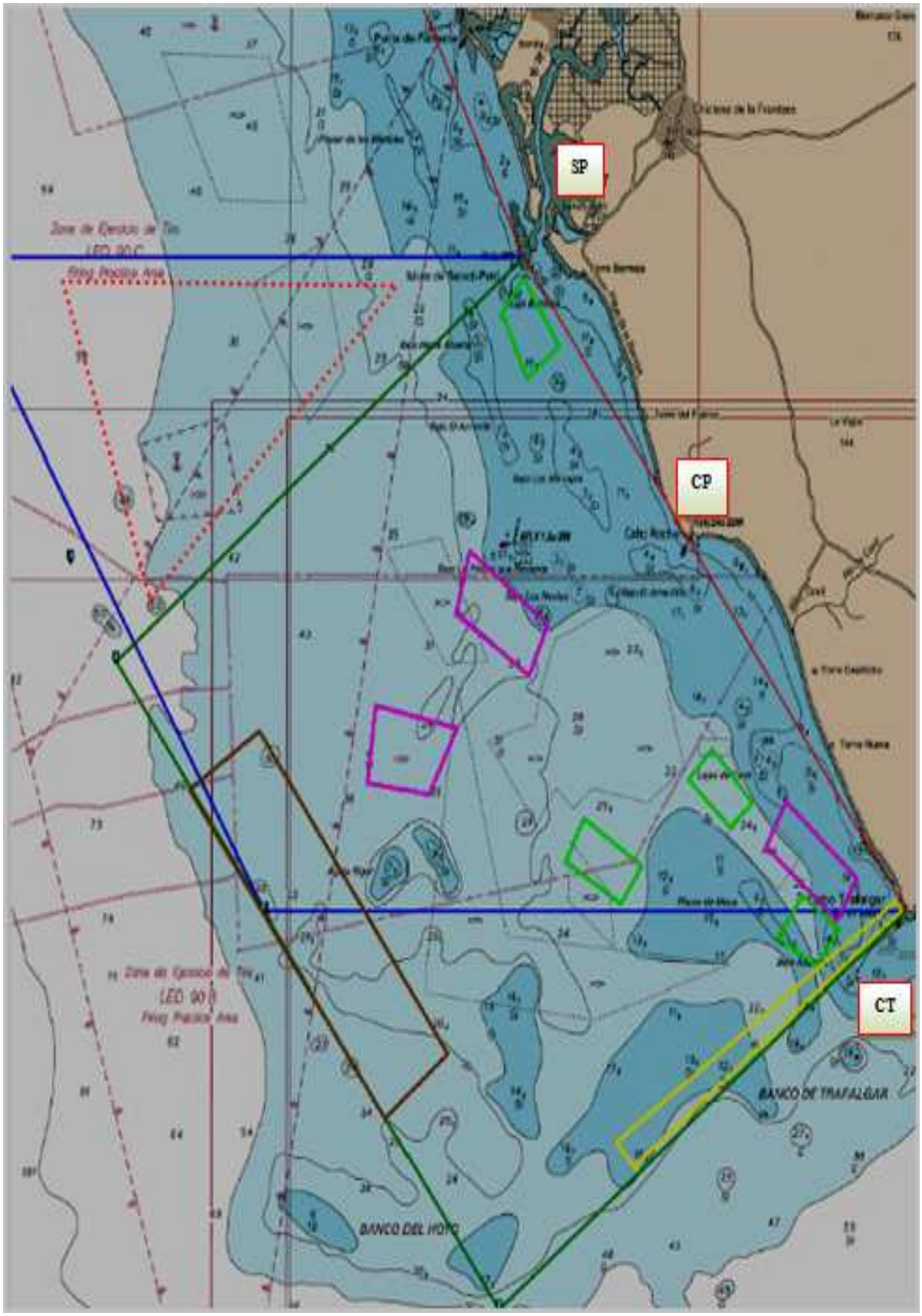
3.2.3. Zonation

Throughout workshops and further meetings between researchers and fishermen a zonation map (Figure 10) was designed for inclusion within the preliminary management plan. The MFR extends to about 15 nautical miles from the coastline and lies entirely in national waters. A seabed cartographic map has been added as supporting data (Figure 11).

3.2.4. SWOT Analysis

In view of a future MFR managed through a bottom-up approach, the information from debates, questionnaires and other interviews was here subjected to SWOT analysis (Strengths-Weaknesses-Opportunities-Threats) (Table 4.). 'Strengths' and 'Weaknesses' refer to pressures from within or characteristics of, the leading management/project group. 'Opportunities' and 'Threats' refer to influential external conditions (Schaltegger, 2003). This analysis is expected to offer a summarized overall outlook at the management process and team, up to this stage.

Figure 10. Proposed Zonation Map (Source: Conil de la Frontera Fishing Cooperative, 2009



	Proposed and accepted zone for the creation of a Marine Fisheries Reserve. This is the area where activity by the artisanal fleet of Conil is concentrated and includes a no-anchoring and no-trawling zone.
	Proposed and Rejected zone for the creation of a Marine Fisheries Reserve. The decline of this area was based on two facts: the zone marked by the red dotted line (……) is less frequently used by the Conil fishermen and moreover it coincides with zones frequently accessed by fishermen from the neighbouring village of Chiclana.
	Important breeding grounds as indicated by fishermen
	Areas with concentration of algal and seagrass beds which are important nursery areas for fisheries
	Areas where high capture is normally recorded
	Areas where high capture was recorded in the past, claimed by professional fishermen to be threatened by recreational fishing
SP	Sancti Petri- one extreme of the proposed reserve area
CP	Port of Conil de la Frontera
CT	Cape Trafalgar- the other extreme of the proposed reserve area

Table 3 Key for Zonation Map

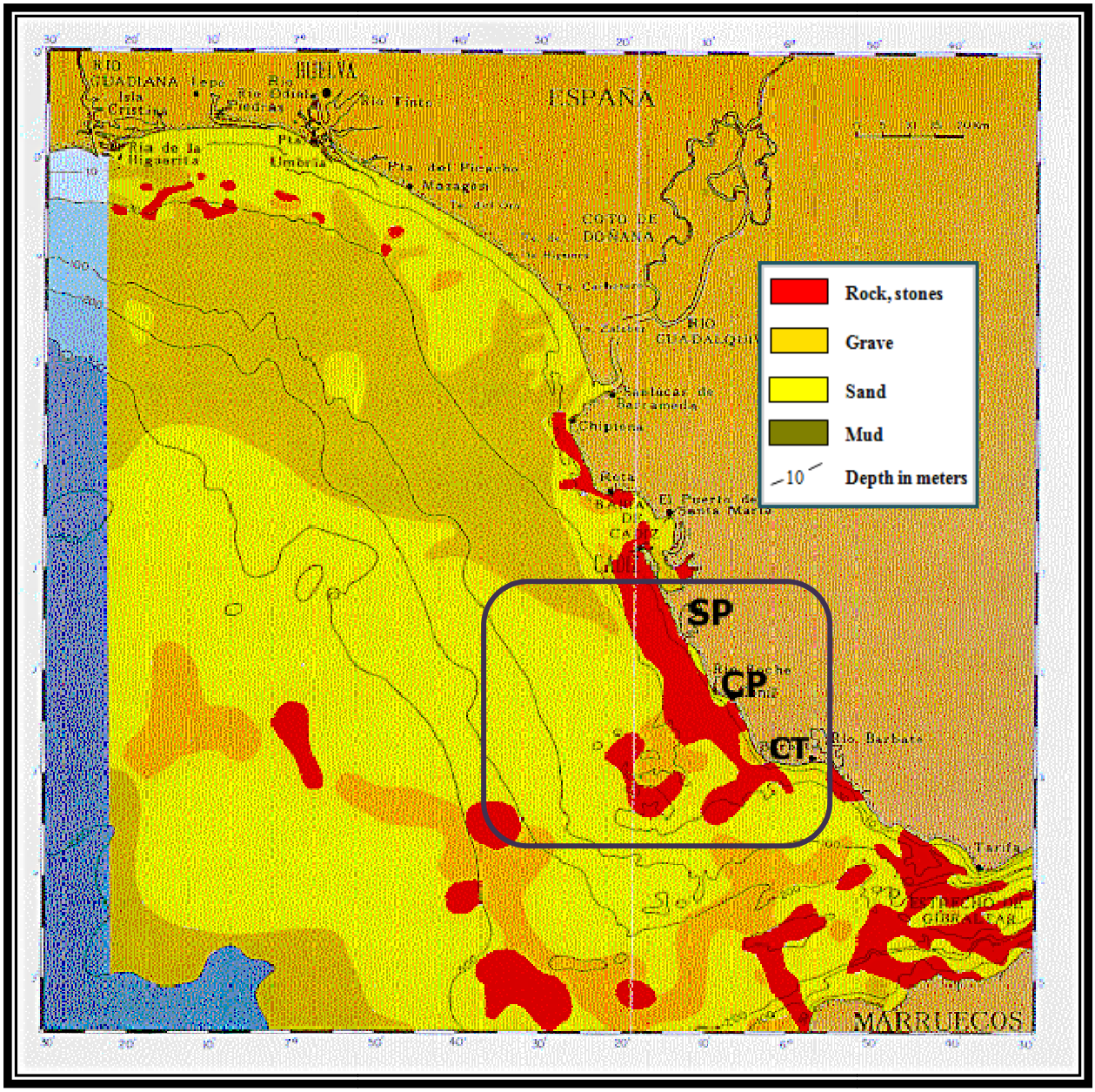


Figure 11. Edited illustration of the seabed cartography of the Gulf of Cadiz and key. The area of the supposed future MFR is highlighted within the rectangle (Ramos *et al*., 1997)

Table 4 Management SWOT Analysis

	INTERNAL	EXTERNAL
POSITIVE	**STRENGHTS** • Recognition of importance of ecosystem approach • Links with environmental and research groups • General positive outlook by fishing community at MFR project • Trust within decision-making group and positivity of fishing sector towards collaboration of other entities • Awareness of challenge by fishing community • Strong leadership	**OPPORTUNITIES** • Use of Os Miñarzos (and others) experience as reference point • Possibilities of alternative activities: Diving, Eco-Tourism, Fishing Tourism, Sustainable recreational fishing • Interest by groups to organize social action (e.g. through educational and cultural activities) for the popularization and appreciation of fishing culture • Improved marketing system e.g. through quality labelling • Likeliness of 'sustainable' classification of products (e.g. under MSC standards) • Improved time-management e.g. investment of low catch/sales periods in other activities • Funds for implementing control mechanisms
NEGATIVE	**WEAKNESSES** • Doubts and concerns of fishing community at preliminary stages = 'insecurity' • Low interest in fishing sector by younger generations. • Feeling of lack of support from administrative levels = Improvable sense of independence • Incomplete participation/interest of fishing community in debates = Improvable base for bottom-up management, poor representability, risks of individual interests effecting decision process = need of mentality change • Improvable sense of guardianship • Uncertainty towards novel activities within the reserve • Improvable responsibility distribution	**THREATS** • Illegal activities (fishing, selling etc) especially bottom trawling (*tren de bolos*) • History of conflicts with vessels from neighbouring areas • Impacts, known or unknown, from novel projects as aquaculture and off-shore wind-farming • Instability of Bluefin Tuna fishing

3.3. Bibliography

Callum, M.R., Bohnsack, J.A., Gell, F., Hawkins, J.P. & Goodbridge, R. (2001) Effects of Marine Reserves on Adjacent Fisheries. Science. 294: 1920-1923

Cofradía de Pescadores Lira (2009) Un proyecto de desarrollo sostenible: Construyendo el Futuro. Presentation at Conil de la Frontera, 19th June 2009.

Consejería de Agricultura y Pesca de Andalucía (2005). Estadística Pesquera: Conil de la Frontera (Cádiz): 1992-2003. Consejería de Agricultura y Pesca. Publica: Viciconsejeria: Servicio de Publicaciones y Divulgación.

Consejería de Agricultura y Pesca de Andalucía (2008). Producción Pesquera Andaluza: Año 2008. Colección: Pesca y Acuicultura, Serie: Sociología y Política Pesquera

Ecologistas en Acción (2009). Aliento de Esperanza para el Mar y sus Gentes. Final Conclusions and Proposal of Resolutions of the Days of Fishing, March 2009, Conil de la Frontera. [online] Available at: http://www.ecologistasenaccion.org/spip.php?article14077 Accessed on: 08/01/10

Empty Oceans, Empty Nets: The Race to Save Marine Fisheries [movie-documentary] (2002). Interview to Paul Parker, Hook Fisherman and Executive Director of the Cape Cod Commercial Hook Fisherman's Association. Directed by Habitat Media, 120 mins.

Europa Press (2009) Agricultura es galardonada por el Sistema de Localización de Embarcaciones Andaluzas. Europa Press. 14 November 2009 [online] Available: http://www.europapress.es/economia/noticia-agricultura-galardonada-sistema-localizacion-embarcaciones-andaluzas-20090113122542.html Accessed on: 25/11/2009

European Commission (2009) GREEN PAPER Reform of the Common Fisheries Policy [online] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0163:FIN:EN:PDF Accessed on: 18/11/1009

Florido del Corral, D. (2008) Las Flotas Artesanales Andaluzas en un Contexto de Crisis. p.267-279, In: Instituto de Estudios Maritimos (2008) Lecciones de Economía Pesquera. A Coruña: Netbiblo. 2008.

Florido del Corral, D. (21st September 2009) [pers.comm.] Interview

Florido del Corral, D. (2010) El espacio portuario de Conil en Cabo Roche. Infraestructuras socioeconómicas, políticas y de ingeniería. Agencia de Puertos de Andalucía. [In Press].

Gomez Blanco, J.M. (11 September 2009a) [pers.comm.] Email to S. Camilleri

Gomez Blanco, J.M. (9 October 2009b) [pers.comm.] Email to S. Camilleri

Himes, A.H. (2007). Performance indicators in MPA management: Using questionnaires to analyze stakeholder preferences. Ocean & Coastal Management 50 (2007) 329–351

Marine and Fisheries Resource Group, A Coruña University (2007). Diseño, propuesta y evaluación de la Reserva Marina de Interés Pesquero "Os Miñarzos" en la Cofradía a de Lira-Carnota (A Coruña). [online] Available at: http://www.slideshare.net/jfreire/evaluacion-reserva-marina-os-Miñarzos-galicia Accessed on: 15/01/10

Marine Steward Ship Council (2009). Marine Stewardship Council: Certified Sustainable Seafood. [online] Available at: www.msc.org Accessed on: 19/01/10

Ramos, F., Sobrino, I. & Jiménez, M.P. (1997). Cartografíado temático de los caladeros de la flota de arrastre en el Golfo de Cádiz. Consejeria de Agricultura y Pesca, Junta de Andalucía, 44 pp.

Schaltegger, S., Burritt, R., & Peterson, H. (2003) An introduction to corporate environmental management: striving for sustainability. Sheffield, U.K.: Greenleaf Publishing.

CHAPTER 4

STAKEHOLDER IDENTIFICATION AND ANALYSIS

4.1. Stakeholder Groups

For the sake of organization and practicality, stakeholders identified through the research process were grouped in four groups as depicted in Figure 12.

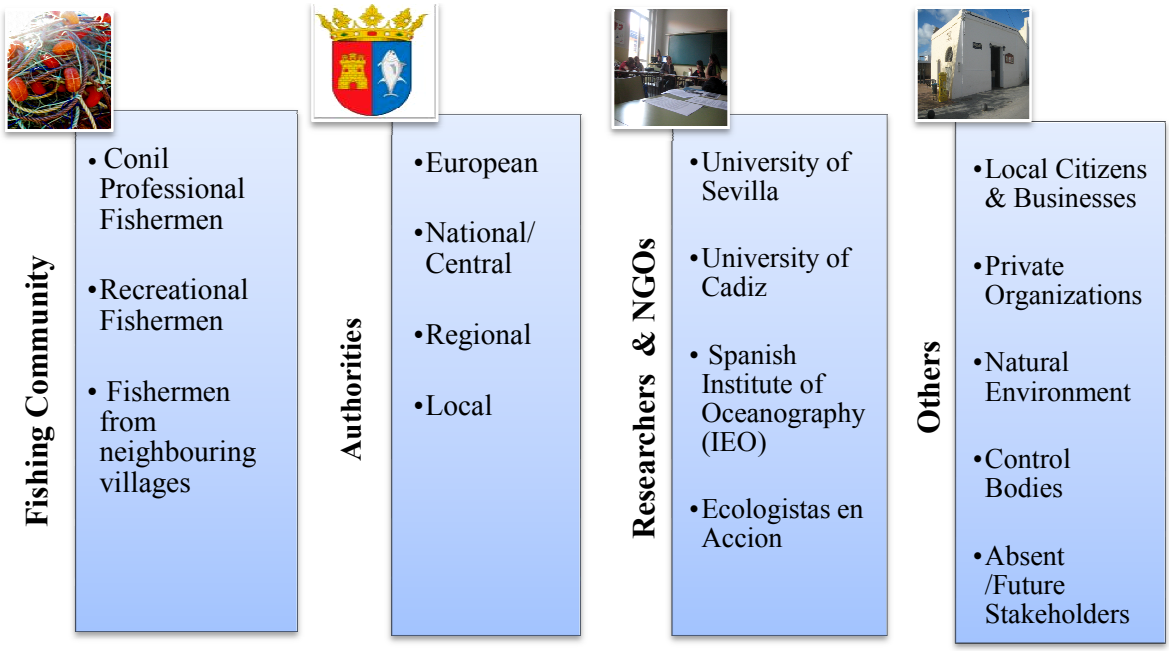


Figure 12. Stakeholders identified and classified

Following are detailed descriptions of the stakeholders identified and their fields. These descriptions do not all go into the same amount of detail owing to (i) time limitations which made it necessary to prioritize groups, (ii) the early stages at which the management process was during the time of the study and (iii) the type of management approach applied, all reasons resulting in some stakeholders having a more evident role than others.

4.2. The Fishing Community

4.2.1. The Professional Fishermen

Within this port is **a fleet whose 'family' character has been strengthened** following an episode which has most strongly shaped the fleet today: the blocking of EU-Morocco fishing agreements[9] in the late 90s (through which fishermen were employed on purse seiners, shrimp trawlers and long liners) which led to 'organisational redeployment around the family' and the concentration of capital and labour around the family unit. Familiar-ties (tendency of boat owners being part of the sailing crew and passing on their business to their sons) have strengthened as an adaptive strategy to resist in times of crisis, with past options of investments also being less common (Florido del Corral, 2008a).

[9] According the E.U.`s economic targets and in the light of 'commerce liberalization', the choice of importing fish products and raw material and exporting technological and industrial products, was finally cheaper. This move was supported by tendencies of development in these North African territories (Florido del Corral, 2008b).

Meanwhile the fleet formed in Conil **has also been re-modelled by other global economical and political forces,** so much so, that Florido del Corral (2008a) felt the need to redefine the 'artisanalization' concept. Conil`s fishing population is here presented as it is under such influences in an attempt to give a most realistic depiction of what it is nowadays.

Firstly **extractive effort has shifted from a multi-gear/multi-species type (typical of artisanal fleets) to one typically specializing in fewer gear and targeted species.** This shift has been partly driven by incentives offered by profits through new markets but may also based on more favourable labour and redistribution conditions. Such is the case of octopus (*Octopus vulgaris*) fishing using locally created hand-jigs (*pulperas*). As a result this sector was characterized by a maximization strategy employing greater effort through increase of crew numbers leading to seasonal exhaustion of catches. The fishing community has sometimes justified this by claiming the octopus being a 'seasonal species', but in reality the maximization strategy is a considerable cause. The years of this last decade, during which the octopus fishery has been less successful led Conil fishermen to re-focus on the use of bottom-set long lines especially targeting the Silver Scabbard fish (*Lepidopus caudatus*) due to its high consumption in neighbouring Portugal but also capturing other species of great commercial value as the Blackspot Seabream (*Pagellus bogaraveo*) and the Common Seabream (*Pagrus pagrus*). This fishery is infact shared with fleets from adjacent villages (Barbate and Algeciras) through a demarcation system (Florido del Corral, 2008a).

Thus the new artisanal model, characterized **by this 'specialization-intensification-exhaustion' cycle**, is strongly driven by commercial interests or rather a struggle to make catches profitable and tends to be **typified by collapse due to a poor bio-economic (ecosystem vs. economy) equilibrium.** As Florido del Corral (2008a) claims, this model has replaced the old system of following seasonal productive diversification to adapt to the ecosystem and instead become innovative in other aspects: technical and economical. It is therefore closer to modern global (economical/political) patterns and rhythms rather than to natural patterns.

Diversification, as the inter-annual changes spurred by low octopus catches, had become a reserve strategy in times of low production, rather than an ingrained natural approach of the fleet. However it seems that **the importance of diversification has been acknowledged in recent management decisions** as: the implementation of net and long line equipment on vessels making them polyvalent, the search for new fishing grounds and new marketable fish species for the extended use of bottom-long lines (considered to be a more selective method) (Florido del Corral, 2010).

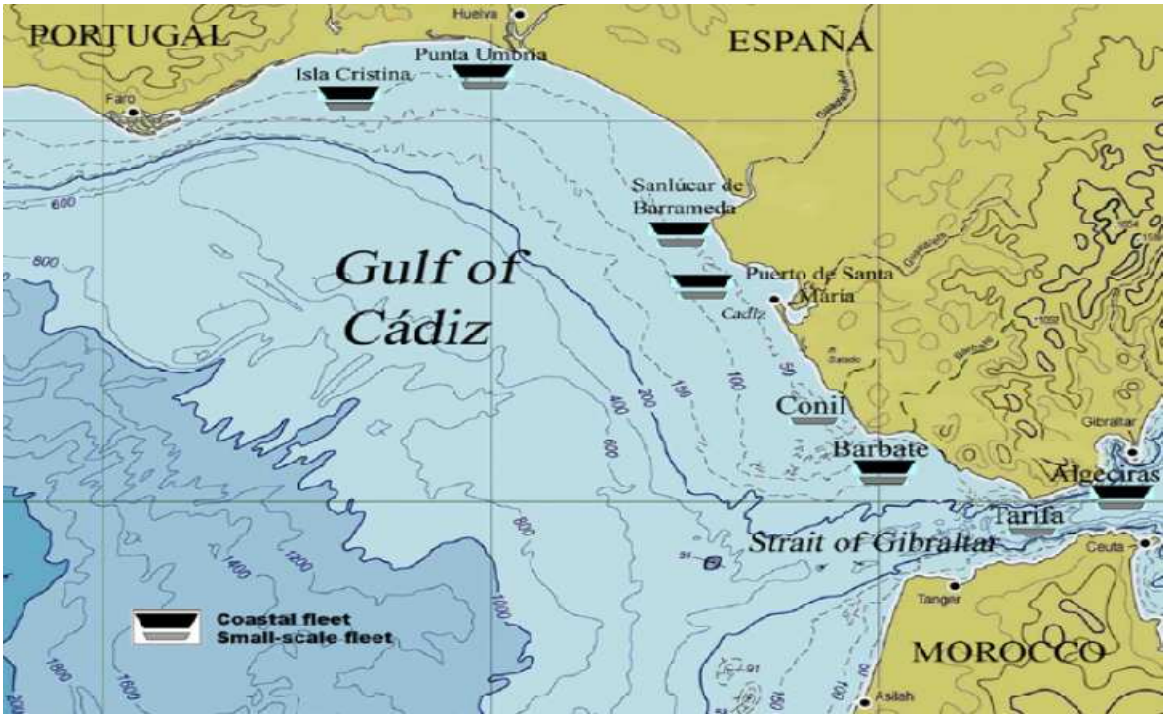
This 'specialization-intensification-exhaustion' trend has also been fuelled by funds directed to fleet modernization (vessels with greater draught and length) and improved technological conditions facilitating navigability (GPS, sounders, sonar plotters) accompanying traditional vernacular knowledge. A consequence of this modernisation process has also been an increment in expenses which has re-structured the accountability

system of fishermen who have to account for higher costs of fuel, tackle etc. (Florido del Corral, 2010).

The modernization process was also supportive towards the use of more intensive techniques as are gill and trammel nets targeting a variety of other valuable species such as various Seabream species, small-sized sharks, the Common Pandora (*Pagellus erythrinus*) and the Rubberlip Grunt (*Plectorhinchus mediterraneus*). Nets have low selectivity and the use of this tackle to target some species rather than other depends very much on the fishermen`s knowledge of fishing ground productivity. Net methods made of nylon monofilaments, referred to as '*artes de tripilla*', have been one of the cause for conflict within the fleet in Conil itself, being condemned by some as too intensive. Such conflicts may also arise through exclusion of fishermen with no familiar relations on board (Florido del Corral, 2010). **Thus a competitive and tense environment is sometimes also present between members of the same fleet.**

Sentiments of conflicts with other fishermen from neighbouring villages (Figure 13.) arise from the feeling of an unjust reality where this port is one of the very few (others are Rota and Tarifa) whose activities are totally small-scale and artisanal and do not include trawlers or purse-seiners which are concentrated to different extents within fleets of the neighbouring ports of Barbate, Huelva, Isla Cristina, Punta Umbria, Cadiz and Sanlúcar de Barrameda. This sentiment is especially accentuated towards illegal activities by sections of these fleets, the so-called *'furtivos'* or *'piratas'*. Fishermen in Conil have also admitted seeing some landing their catches in the port of Conil itself. Meanwhile in the context of the creation of a MFR new possible conflicts must be anticipated.

Figure 13. Map showing concentration of fishing ports around Conil de la Frontera. (Reference: Florido del Corral, 2010)



Meanwhile another group of fishermen in Conil work for the famous-by-tradition **almadraba**[10] fishery which has in the recent years recuperated owing to high prices obtained for the target species (Bluefin Tuna) on the Japanese market and the investment by families[11], with historical ties to the almadraba industry, in almadrabas of the National Consortium of the Almadraba (*Consorcio Nacional Almadrabero*), last heard of in the early 70s. In Conil, the crew is majorly from the village itself (consisting of around 80 members) as is required by administrations permitting its operation, emphasizing that new vacancies be filled by individuals from the locality where the nets are anchored, despite the chance of going against the traditional system of vacancy passed from father to son. The majority of the product is directly transferred from the capture sites to Japanese ship-factories with freezers and transported to Japan, whilst local employees are responsible for the selection of parts used to prepare conserves of local commercial value. Additionally in Conil, in 1991, the Cooperative achieved the marketability of the almadrabas by-catch, like other smaller tunids (Florido del Corral, 2010). Meanwhile the almadraba companies hold a base warehouse in Conil for storage and maintenance of almadraba equipment during the resting months of the year. During the last years this traditional technique has been the central protagonist of controversies, protests and big decisions taken around this traditional technique (Chapter 5.)

4.2.2. The Recreational Fishermen

Recreational fishing in Conil is an old practice, initially exercised by retired fishermen who having abandoned their profession still searched for contact with the environment, the tools and the hunting spirit they lived with throughout most of their lives. The popularity of this sport has boomed in this area, known for its ecological richness[12] and easy accessibility. There are two classes of recreational fishing commonly practised in the area being

[10] Anchored labyrinth of nets which takes advantage of manipulable character of migratory tuna fish, leading them through a series of paths up to the final net where they are finally captured. It is set between March and June and left until the end of July to coincide with the migratory period of the Bluefin Tuna from the Atlantic to the Mediterranean. Being a passive technique, it occupies maritime public domain and so (since regional authorities have taken over fisheries responsibilities) requires double authorization: central and regional (Florido del Corral, 2010).

[11] One of the companies which keeps the right to exploitation of this fishery is owned by the descendents of 'Aniceto Ramírez' , a traditional family-based company which is established in Barbate since 1920s. The other company belongs to family 'Crespo'. Today, there is a further commercial company from Conil. (Florido del Corral, 2010).

[12] This richness is explained by the presence of 'phytoplankton blooms'. These are triggered by continental nutrient inputs mainly from the Guadalquivir River. Here tidal forcing generates a pool of warm and chlorophyll-rich water that makes the area highly productive and favours an efficient transfer of primary production towards higher trophic levels as proved by high zooplankton concentration nearby the Guadalquivir mouth. Infact, anchovy, whose larvae are known to feed on copepods in this area, as well as many other fish species, all exhibit high concentrations of early life stages at this region. This is coupled by episodes of upwelling favoured by the predominance of westerlies (winds) and connected to the generation of good environmental conditions for nursery and fishing grounds (Lafuente &Ruiz, (2007) and Prieto, L. et al., (2009)).

considered: underwater fishing (*pesca submarina*) and angling (*pesca con caña*) from land or from boats.

As stated by Pirla (2009) there might be around 40 recreational vessels from which underwater fishing is practised in the area concerned. This activity is more common in summer and average catches are usually of one piece per fisherman (2-3 fishermen per vessel) in concordance with Article 4 of the 'Regulations for Recreational Sea Fishing in Spain'[13]. This activity remains unrepresented by any official organization and its reputation is relatively threatened owing to the fact that its popularity is on the rise, catches are more evident due to the exposed nature of the vessels used (when compared to angling for instance) and disrespectful use of port facilities and illegal actions, as the commercial use of catches [14]. This has led to a greater hostility between 'professionals' and 'recreationals' expressed in a few conflictive episodes over fishing grounds.

Such perceptions are felt, by underwater fishermen, as being unjust as in reality this sport is relatively harmless usually targeting adult fish which have already reproduced at least once and its practice is greatly limited by weather conditions, as a result of which the impacts on fish populations and the ecosystem in general are minimal. Pirla (2009) infact claimed that in his view, what a professional vessel captures in one week is equivalent to what all underwater fishermen would capture in one year.

Moreover such individuals, as Pirla (himself an underwater fishermen) demonstrated, were real tritons who best witnessed what occurred under the surface of the sea and apart from fishing dedicated themselves to diving and documenting the life underwater through photography and videography. Amongst the changes reported are:
Loss of area of seagrass meadows, mainly linked to trawling operations
Higher eutrophication levels (for up to 10 miles from the coast) from sources of agricultural run-off, sewage treatment plants and the Guadalquivir River further up the coast. Eutrophication was linked to lower fish population as the Rubberlip Grunt and the Redband Seabream and with the exception of the Dusky Grouper 'el Mero' (*Epinephelus marginatus*) claimed to protect itself in sheltered spots where the effects of eutrophication are not as strong)
Long-term ghost-fishing mainly caused by synthetic (non-degradable) trammel nets and abandoned traps which attracted one prey after the other

Pirla (2009) echoed the belief of part of the fishing population i.e. that of the ecological damaging outcomes of net methods in comparison to hook methods and foresaw the end of the fishing industry in ten years, unless action was taken to change certain situations. Amongst such changes he pointed out at the limited pro-environment mentality of the 'professionals' but also admitted that the loss of practices as is 'dynamite fishing' was a sign

[13] BOE núm. 180 de 28.07.2000
[14] Interviewed individuals have stated that catches sold illegally by recreational fishermen sometimes reach higher prices and additionally some individuals are 'recreationals' during weekends are 'professionals' during the week.

of improvement. He ended with a final idealistic comment ‘if the only fishing allowed would be of a recreational scale, habitats and populations would definitely recuperate fast. This is an already existing alternative in some states in the USA.’

On the other hand, anglers can be said to be well represented by the Nautical Club of Conil, as most of its members as well as being owners of small recreational vessels are passionate practitioners of this sport. Since they share the ‘professionals`’ fishing grounds, between Sancti Petri and Cape Trafalgar, it is not surprising that a certain degree of antagonism between these groups has also been reported. However underwater fishermen were more strongly criticized and nowadays communication between the ‘professionals’ and anglers of the Nautical Club seems to be of the more positive kind especially owing to the close knit, familiar environment (explained by the smallness of the villages of the area). Exchange of useful information between the two groups was also common, where on many occasions whilst fishing in the same environs one would call out to another ‘*dame una piedra*’ i.e. ‘pass me the coordinates of good fishing grounds’. Collaboration was based on familiar links or acquaintance and on the fact that anglers might have been professionals in the past. Meanwhile this group was also aware of problematic issues as trawling and pollution (Morillo, 2009).

Figure 14. Snapshots from the port of Conil de la Frontera (Reference: own photos)

4.3. Authorities

Table 5. Organization of 'Authorities' into four levels

4.3.1. Local Authorities

The dominant local authority in this case study is the Fishing Cooperative of Conil de la Frontera. This is a body governed by Public Law and defined as a non-profit organisation. Since 1987 it has been the Official Concessionaire of the Fish Market of the Fishing Port of Conil, managing this unique point of sales as well as the system of charges and payments of sales (Ayuntamiento de Conil de la Frontera, n.d.)**.** Normally it represents almost all the fishing sector of Conil, except for the almadraba crew which are normally represented by the **Workers` Commission C.C.O.O.** (however almadraba workers may frequently work on smaller boats simultaneously). Presently the association represents around 130 shipowners who receive benefits such as those related to commercialization, supplies of gas, ice and oil, accounting, management of paperwork and representation infront of other administrations. In return the Cooperative benefits through charges on the shipowners: a net 5% of what is sold (3% for selling operation and 2% for service supply) as well as charges on buyers (Florido del Corral, 2010). Its recent work was dedicated to the guarding and management of its fishing grounds and resources, through elaboration and the implementation of internal agreements affecting the fishermen of this port, and due to demand by competent administrations of measures and legislative developments for the control of fishing activity in the fishing grounds of the Gulf of Cadiz. Such actions are very important this being a greatly conflictive zone owing to the restriction of Spanish fleets to fish in Moroccan waters and the rise of new fishing techniques.

the transformation of the commercialization system through the computerization of sales, the identification of fish production through a system of labelling, guaranteeing the products origin and justifying its price and directing projects as those for modernizing the fleet though the I (1997-1999) and II (2002-2004) Port Plans (*Plan de Puerto*) supported by E.U. funds (Section 4.3.4.). (Florido del Corral, 2010)

The Cooperative benefits from both political and social legitimacy both at an internal level- since decisions are usually taken in plenary sessions accommodating the participation of the majority of the fishermen- as well as on an external level, building connections with other port users and administrative levels. The historical validity of customs and uses is the key for the acceptance and support of proposed measures by the authorities (Florido del Corral, 2010). Amongst its collaborations is that of the end of the 80s within the **Organization of Producers of Fresh Artisanally Caught Fish Products-36** (*Organización de Productores de Pesca Fresca Artesanal -36*) for the promotion of commercial activities. This organization lives on however the Cooperative is no longer part of it (Florido del Corral, 2010). A more recent collaboration is that with the **Committee for the Defence of Artisanal Fishing** (*Plataforma para la Defensa de la Pesca Artesanal*) composed of Local Councils of Barbate, Conil and Tarifa, the Deputation of Cadiz and various cooperatives, marketing agencies, political parties and syndicates amongst others, created to support threatened artisanal methods as the almadraba (La Voz Digital, 2009).

As for the recreational fishing domain, this is represented by the **Nautical Club of Conil**. Since 2008, this club, which falls under the management of A.P.P.A (Section 4.3.2.), owns its official quarters in the port itself where its 160 members can meet, organize related activities and take care of administrative or financial chores. It is also in charge of the floating docks to which a total of 100 boats are moored. The system used for allocation of the berths is one of 'first come, first served' with a waiting list for others requesting a berth for their vessel. Members in possession of a berth can never sell their position and upon passing away or resigning from the club their position may only be passed to the nautical club again (which will then pass it to the next on the list) or to close family members (that is to say wife, children or brothers). From what is earned through the renting of berths, the nautical club offers some basic services such as: electricity and solar panelled external lighting, security and cleanliness of the area and headquarters. Additionally it holds activities of interest to its members such as informative talks about nautical matters[15] and skipper certificate courses. The club also organizes three recreational fishing competitions a year: one in July to celebrate the patron saint of Conil`s fishermen *La Virgen del Carmen* during which all species are targeted, another in September to celebrate the *feria* coinciding with *Nuestra Señora de las Virtudes* targeting squid and cuttlefish, and another in December focussing on the locally called *pesca al curricán* [16] (Morillo, 2009). The club`s president, Morillo (2009), explained how the politics and philosophy of this club reflect the familiar environment of the port, lead

[15] During one such session members were informed about sailing precautions in the proximity of cetaceans (Morillo, 2009).

[16] This term refers to angling using a fishing lure that is an object attached to the end of a fishing line, designed to resemble and move like the prey of a fish, thus catching the fish`s attention so that it bites the attached hook/s.

by the aim of providing affordable service to its members and values such as familiarity and simplicity. Thus it is exemplar of true social service as opposed to the capitalistic arrangement normally associated with nautical clubs.

4.3.2. Regional Authorities

One very significant regional authority is that of the **'Ports of Andalusia Public Enterprise' (A.P.P.A.)** [17], branching from the Andalucian Regional Council (*Junta de Andalucia*) following the creation of the 1992 Law of Ports (later replaced by the 1997 Law of Ports) which distributed the various port-related responsibilities amongst the national, regional and local authorities, and marked a historical shift of especially fishing-port responsibilities from a national level[18] to a regional one. The A.P.P.A is a body governed by Public Law ascribed to the Regional Ministry of Public Works and Transport responsible for the development and implementation of port policy (Florido del Corral, 2010) this implying that almost all control, management and promotion of infrastructures, services and economic activities held in the port area depend on this body. Its political tendencies shifted towards the strengthening of the sport character of ports as that of Conil, as this option presented better economical benefits. Such tendencies gave rise to conflicts with the fishing community and local political groups. Such conflicts, as well as the rising value given to the natural heritage in the area can be the reasons for which the port has relatively maintained its traditional character despite the popularization and promotion of recreational activities. Despite all this, the A.P.P.A. has played a fundamental role in the improvement of services and infrastructure that have reinforced the port`s fishing character, as have been its contributions to the Plans for the Modernization of the Andalucian Fishing Sector (*Plan de Modernización del Sector Pesquero Andaluz*) from 1997 to 2006, a political tool of the Regional Ministry of Agriculture and Fisheries of the Andalucian Council, relying to the greatest extent on financial support from the E.U. (Section 4.3.4.). The A.P.P.A. also counts on other planning and financial instruments including the Multiannual Plan of Actions of the A.P.P.A 1997-2000 (*Plan Plurianual de Actuaciones de EPPA*) and the Director Infrastructure Plan of Andalucia (*Plan Director de Infraestructuras de Andalucía*) 1997-2007, both being supported by proper funds as well as E.U. funds. (Florido del Corral, 2010).

The **Andalucian Regional Council** (*Junta de Andalucia*), gives rise to other important branches of significance in this context. The relevant administration under its sphere is the **Regional Ministry of Agriculture and Fisheries of the Andalucian Council** (*Consejería de Agricultura y Pesca de la Junta de Andalucía*) under which falls the **Department of Fisheries and Aquaculture** (*Direccion General de Pesca y Acuicultura*). In addition to all

[17] Previously known as E.P.P.A

[18] The first structural alterations carried out in the port of Conil occurred in the beginning of the 80`s, giving rise to the construction of a sheltering breakwater. These changes were carried out under the framework of the Administrative Commission of the Group of Ports, belonging to the Ministry of Public Works and Urbanisation. Nowadays this national administration is simply known as the Ministry of Public Works (=Ministerio de Fomento)

established in Article 30 of Law 9/2007 of the 22nd of October it has the following roles (i) the research and evaluation of fishery resources and the adoption of protection measures through the declaration of reserves and zonation (ii) inspection and control of fishery activities, including landings and marketing (iii) development and modernization of the sector (iv) promotion of fishery activity through fund organization and management (v) regulation of marketing strategies (vi) promotion of related industries and products and (vii) support of associations with ties to the sector (Junta de Andalucia, 2010).

An important group ascribed to this is Regional Ministry is the **Public Company of Agricultural and Fishery Development** (*Empresa Pública Desarrollo Agrario y Pesquero, D.A.P.*) created by the Andalucian government to manage projects of high technological value and elevated technical specialization in agricultural and fishing fields. In Conil it is linked with 'Integrated Aquaculture' projects (Empresa Pública Desarrollo Agrario y Pesquero, 2010).

4.3.3. National Authorities

What was previously known as the Ministry of Agriculture, Fisheries and Food (*Ministerio de Agricultura, Pesca y Alimentación* [M.A.P.A.]) amalgamated with the Ministry of the Environment and through the Royal Decree 432/2008 and became what is now the **Ministry of the Environment and Rural and Marine Affairs** which at a national level assumes the responsibilities of proposal and execution of the governmental policies in matters related to climate change, protection of the natural heritage, biodiversity and the sea, water, rural development, agricultural, livestock and fisheries resources and food (Ministerio de Medio Ambiente y Medio Rural y Marino, 2009). In the history of Conil de la Frontera, this authority has been influential in defining a more restrictive nature of fisheries management, for example through efforts for the official recognition and implementation of local proposals through the creation of Royal Decrees and Orders. Other central administrations such as the Ministry of Transport and Communication (nowadays known as the **Ministry of Public Works** = *Ministerio de Fomento*) have been equally influential for example through the Royal Decree 681/1980 for the organisation of national fisheries. Such acts arose from concerns about maintaining foreseeable levels in the exploitation of fishery resources, justified by environmental criteria and understood as a better alternative to the limitations of access to waters of Tertiary states (like Morocco).

4.3.4. International Authorities

Within this context the **European Commission/Union (E.U.)** is the most significant entity driving influential processes. It`s weight, in the area studied, has been exerted through policies, as has been that of the European Mediterranean Policy, influential in the termination of fishing agreements between Morocco and the E.U., as the renewal of such agreements within the (almost) solely commercial objective of the E.U. did not make economic sense. The Common Fisheries Policy, currently under revision and to be newly proposed in 2013 (European Commission , 2009) is another strong influence involving a combination of

financial and political tools to act on a series of lines including resources, structures, marketing and agreements with third countries. Its liberalization of commerce has put regional/local sectors as that of fisheries in a more competitive scenario. Another target of the CFP was the reduction of the exploitation power through funds for the dismantling of part of the European fleet, a strategy said to have failed its target as funds were directed to the technological modernization which did not contribute to reduction of fishing effort of the fleet (Florido del Corral, 2008). Such funding programs included: the Financial Instrument of Fishing Orientation (Instrumento Financiero de Orientación de la Pesca, I.F.O.P.) from 1994 till 2006; the Fisheries Community Initiative (Iniciativa Comunitaria Pesca) from 1994 to 1999, the Social European Funds and the FEDER funds. The financial support in the application of the Plan for the Modernization of the Andalucian Fishing Sector[19] and the distribution of the execution of this plan from 1997 to 1999 - 88% of the projects and 91% of the inversion proceeded from the I.F.O.P. - demonstrate the relative contribution of the E.U. in recent processes (Florido del Corral, 2010).

Within this 'liberalization' context, the results in Andalucia have been variable with that the port of Conil being one of the most successful ports reaching high market prices for its products, as opposed to the less fortunate Barbate where stagnation took over; this fate being partly dependant on the species marketed (Florido del Corral, 2008).

4.4. Researchers and NGOs

The area has been thoroughly researched from various aspects. Leading research institutions, which have covered the province of Cadiz and area of Conil specifically, include:

- The Social Anthropology and Human Geography Department of the **University of Seville**
- The Faculty of Marine and Environmental Science at the Puerto Real Campus of the **University of Cadiz**
- The **Regional Ministry of Agriculture and Fisheries of the Andalucian Council** through studies of a scientific nature
- The **Spanish Institute of Oceanography** (*Instituto Español de Oceanografía*) which is an autonomous organ deriving from the Ministry of Education and Science dedicated to the multidisciplinary investigation of the sea especially resource related issues (as fisheries and aquaculture). It participates, as scientific advisor, in international negotiations over bilateral fishing agreements with the E.U., Morocco, Mauritania and others, as well as over multilateral ones with various international commissions. Amongst its ten centres in Spain it holds one in Cadiz. **(**El Instituto Español de Oceanografía, 2009)

[19] The most relevant programmes of this plan in this case were the 4th one; Modernization of Fishing Structures (which aimed at improving working conditions through construction or enlargement of existing port facilities, modernization of existing facilities of urbanization and energy resources, dredging projects etc.) and the 5th one ; Technological Modernisation of the Process of Marketing and Distribution of Andalucian Fishery Products (aimed at improving the sales of fisheries products as well as the facilities of manipulation and conservation of products).

Meanwhile ***Ecologistas en Acción*** (Ecologists in Action) is one of the most active and influential environmental NGOs with particular attention to the marine environment, in the area. With many more branches in Spain it is a confederation acting as an umbrella to more than 300 ecologist groups, working in what is referred to as 'social ecologism'; approaching environmental issues by an understanding of the social cause. Its work is expressed through campaigns, reports of illegal or (environmentally) damaging acts and proposal of alternative solutions. In Cadiz, it is strongly linked to the University and through work by volunteers it has a well established portfolio of research activities running. It even has a direct role within the management procedures for the MFR creation in Conil.

4.5. Others

Less evident stakeholders must not be omitted within management considerations and the possibilities of further stakeholders being involved throughout the process of the creation of the MFR must not be excluded. Other probable or possible participants would be:

- **Local citizens and businesses especially those of the recreational kind**: Diving Schools, Restaurants, Hostels and Hotels, the Conil de la Frontera Museum (*Museo de Raíces Conileñas*), Tourism Agencies etc.
- **Local businesses related to marketing and distribution** of fresh and frozen sea products along with conserves.
- **Private Organizations with links to alternative activities** with possible future links to the reserve: as is fishing-tourism, aquaculture, wind-farming etc.
- **Other Cooperatives and NGOs**
- **Control bodies** as are the Fishing Inspection Service of the Regional Council of Andalucia, SEPRONA (Service of Protection of Natural Areas) and the Marine Civil Guards
- **Future generations**
- **The natural environment**

4.6. Bibliography

Ayuntamiento de Conil de la Frontera (n.d.). Cofradía de Pescadores [online] Available at: http://www.conil.org/Asociaciones/Cofradia/cofradia.htm Accessed on: 22/10/2009

Empresa Pública Desarrollo Agrario y Pesquero (2010). Conócenos. [online] Available at: https://www.dap.es/dapweb/servlet/FrontController Accessed on: 5/03/2010

Florido del Corral, D. (2007). Challenges and responses in fisheries management systems. The case of artisanal fleets of the Atlantic coast of Andalucia. In: Rubio-Ardanaz, J.A. &

Erkoreka, A. (Eds). Cultura y Sociedades marítimas: praácticas especificas, sistemas técnicos, sociales y de representación. Zainak. 29, 2007, 101-122.

Florido del Corral (2008a) Focusing on artisanal fleets in a new scenario: The case of Andalucia (Spain). Marine Policy 32 (2008) 1004–1012

Florido del Corral, D. (2008b) Las Flotas Artesanales Andaluzas en un Contexto de Crisis. p.267-279, In: Instituto de Estudios Maritimos (2008) Lecciones de Economía Pesquera. A Coruña: Netbiblo. 2008

Florido del Corral, D. (2010) El espacio portuario de Conil en Cabo Roche. Infraestructuras socioeconómicas, políticas y de ingeniería. Agencia de Puertos de Andalucía. [Not Published].

El Instituto Español de Oceanografía (2009) Presentacion [online] Available at: www.ieo.es Accessed on: 08/02/10

European Commission (2009). About the Common Fisheries Policy [online] Available at: http://ec.europa.eu/fisheries/cfp/review_en.htm Accessed on: 18/11/2009

Junta de Andalucia (2010). Agricultura y Pesca: Dirección General de Pesca y Acuicultura. [online] Available at: http://www.juntadeandalucia.es/agriculturaypesca/portal/opencms/portal/Organigramas/direccion_general_pesca_acuicultura Accessed on: 08/02/10

Lafuente, J.G. & Ruiz, J. (2007).The Gulf of Cádiz pelagic ecosystem: A review. Progress In Oceanography. Volume 74, Issues 2-3, p. 228-251

La Voz Digital (2009). Nace la Plataforma para la defensa de la Pesca Artesanal. [online] Available at: http://www.lavozdigital.es/cadiz/20091127/local/janda/nace-plataforma-para-defensa-200911271311.html Accessed on: 08/02/10

Ministerio de Medio Ambiente y Medio Rural y Marino (2009). Introducción [online] Available at: http://www.mapa.es/es/ministerio/ministerio.htm Accessed on: 28/10/09

Morillo, A (2009) Private Interview. [Interview with Antonio Morillo, President of the Conil Nautical Club, 10 November]

Pirla, A (2009) Private Interview. [Interview with Antonio Pirla, Experienced Underwater fishermen, photographer and videographer, 8 October]

Prieto, L., Navarro, G., Rodriguez-Galvez, S., Huertas, I.E., J.M. Naranjo & Ruiz, J. (2009) Oceanographic and meteorological forcing of the pelagic ecosystem on the Gulf of Cadiz shelf (SW Iberian Peninsula) Continental Shelf Research Volume 29 Issue 1. p. 2122-2137

CHAPTER 5

FURTHUR SELECTED HIGHLIGHTS

The information in the following sections relates to themes linked to the area of the proposed MFR and which should be assumed within future management considerations. It is intended to serve as a general overview for the reader and detail has been subject to time and space limitations. Also all of the subjects are fairly recent or in current state of change, for which updating will be necessary when seriously considering any of the themes during management procedures.

5.1. Illegal Fishing and its Control

Illegal fishing operations are a worldwide concern and its consequences (environmental, economic and social) are such that it has become a priority issue worldwide, especially during the last decade. The European Commission (2010) denominates this phenomenon as 'Illegal, unreported and unregulated fishing' (IUU Fishing). On a global level, such practices have flourished particularly due to use of flags of convenience, increased trade of products processed from fish caught by vessels by any type of flag and increased plundering of resources in the Exclusive Economic Zone (the marine zone over which the nearby country has special rights over the exploration and use of resources) of developing countries by foreign vessels under any flag. Between 2001 and 2002, the FAO and the E.U. adopted Plans of Action against such practices and January 2010 has infact marked the entry into force of:

- the IUU Regulation No 1005/2008 (Published in the O.J. E.U L 286 of 29 October 2008),
- the Fishing Authorisation Regulation (EC) No. 1006/2008 of 29 September 2008 and
- a substantial reform of the EC control system ensuring compliance with the rules of the Common Fisheries Policy by EC vessels, approved by the Council on 20 October 2009

Amongst the components of the IUU Regulation is a 'catch certification scheme' which will also take into account small scale fisheries in export trade and through which the exporter may validate criteria published in Article 6 of the implementing regulation including length or the capacity of the vessel, the place of landing and the gear used (European Commission, 2010). In Conil a certification system (Figure 15.) has been activated since 2003 whereby products are labelled with a plastic tag through which product identification is possible all along the commercial chain (Fernandez Muñoz, 2009). This system might require updating in accordance with the IUU Regulation, with respect to vessel details and gear used.

As mentioned in previous chapters one of the major concerns of professional and recreational fishermen as well as of other stakeholders, is illegal fishing, with special reference to particular methods of bottom trawling (*arrastre de fondo*) known as *tren de bolos* and *tangones*[20], these practices being banned, since 2006, in national fishing grounds[21] for their damaging effects. Additionally regulations for allowed forms of trawling utilized in the Gulf

[20] Tren de bolos: This term refers to heavy (metal) rollers or rock-hoppers attached to trawling nets allowing access into complex rocky habitats without the nets getting damaged
Tangones: this term refers to poles sticking out horizontally from the sides of the vessel thus allowing the larger trawling nets to open up further and so acquire a larger working surface. (Marine Conservation Biology Institute, 2005 & Various Authors, 2001).
[21] Order APA/910/2006 of the 21st of March

of Cadiz have very recently been revised and new orders published[22]. These regulations target (i) mesh size, so as to reduce catches of immature fish and discards of fish of sizes inferior to those specified by regulations, (ii) landings, enforced to take place on the day of catch (iii) subventions during closed seasons (iv) management evaluation; and the most recently added, (iv) closed seasons between specific dates (Noticias Juridicas, 2010). In Conil, despite zonation prohibitions (shown in the Zonation Map in Chapter 3) where allowed forms of trawling are prohibited, the law is still broken.

Figure 15. Product certification in the port of Conil (Fernandez Muñoz, 2009)

Moreover apart from trawling, other prohibited practices are still present in the area, to unknown extents. Illegal small-scale octopus fishing in the area concerned has been recently reported by members of *Ecologistas en Acción* to the Regional Ministry of Agriculture and Fisheries of the Andalucian Council and the Central Ministry of the Environment and Rural and Marine Affairs. The NGO detected the use of tackle used to specifically target the octopus (*chivo, potera, alcatraz*)[23], at 3-7 miles from the coast, from around a hundred recreational vessels taking advantage of the mixed rock and sandy sea bottoms in the area which provide excellent conditions for the reproduction, sheltering and feeding of this species. According to regulations aimed at the conservation and sustainable management of this (octopus) fishery in the national fishing grounds of the Gulf of Cadiz[24], authorized permission for its practice is required. Consequences of such activity are also suffered by the commercial fishery sector, 'as catches are sometimes sold to locals and restaurants in the area, as a result of which the price of the octopus has lowered to around 3 €/kg' (Ecologistas en Acción, 2010).

[22] Order ARM/58/2010, of the 21st of January modifying the Order ARM/2515/2009, of the 17th of September
[23] Chivo: 30 cm nickel tube filled with lead from which hang out a number of hooks, used on rocky bottoms. Shiny fish as sardines are used as bait to attract octopuses,
Potera: Lead or metal spindle with 1-2 crowns of steel pins attached to its end. Used on sandy bottoms.
Alcatraz: Clay pots which the prey mistake for natural refuge spots (Various Authors, 2001)
[24] Article 2 of the Order APA 2438/2005 of the 20th of July

Also, interviewed locals have admitted that in times of financial crisis they still turn to banned home-made tackle, as is the *espinel* and the *atarraya*[25]. The prohibition of such old and traditional practices is still a controversial subject, and their real impact when compared to other tackle is still questionable. However we should differentiate between their use in the past when pressure from both professional and recreational fishing was lower, and the new context with advanced professional fishing and increasing numbers of recreational fishermen resulting in higher exploitation rates on resources. Their prohibition may be thus explained by the fact that this kind of tackle is something between professional and recreational and with chances of popularization being high, in this modern context, prohibition could be viewed as the safest of options.

Examples of mechanisms used in the control of illegal activities in Andalucia include the implantation of 300 so-called '*cajas verdes*' i.e. green boxes, which consist of a GPS and GSM/GPRS[26] system (known as SLFPA[27]) for the localization and tracking of vessels of the fleets fishing for the Blackspot Seabream (*Pagellus bogaraveo*) in the Strait of Gibraltar, that fishing for the Striped Venus Clam (*Chamelea gallina*) in the Gulf of Cadiz and the artisanal fleet of Conil (Olmo Garrudo et al. 2006, 2009 & Europa Press, 2009). However the control of illegal recreational vessels and activities is a more problematic task requiring more direct action by patrolling bodies as is the Fishing Inspection Service of the Regional Council of Andalucia, SEPRONA (Service of Protection of Natural Areas) and the Marine Civil Guards, the enforcement of which would come along upon declaring an area 'protected'. Meanwhile according to Gomez Blanco (2009) improved organization and control implementation by the fishing community is a key factor of success in reducing illegal activity, and the sense of 'guardianship' needed may be developed through the involvement of the fishermen within the initial management team as well as the whole management process and evaluation throughout the reserves` lifetime.

5.2. Offshore Wind Farm Projects

The area around the Cape of Trafalgar has been, during the past decade, the area proposed for various projects of offshore wind-farming. One example is the project, which from all those proposed is located at the furthest distance out at sea, i.e. 'The Sea of Trafalgar Project', which, as shown in Figure 16 coincides with the area hoped to be designated as the MFR.

At a local level these proposals have generated a series of discussions and criticisms from a diverse range of groups, this leading to the creation of the 'Forum about Wind Energy and Sustainable Development in the province of Cadiz'. Florido del Corral (2005) gives us a

[25] Espinel: Long-line laid and fixed parallel to the beach`s shoreline, taking advantage of tides. Atarraya: circular net with lead weights at the bottom, thrown over detected shoals of fish (Various authors, 2001). The recreational use of such tackle is banned by Decree 361/2003 of the 22nd December for the regulation of maritime recreational fishing in Andalucian interior waters (Boletin Oficial de la Junta de Andalucia, 2003).
[26] 'Global Positioning System' and 'Global System for Mobile Communications / General Packet Radio Service'
[27] Sistema de Localización de la Flota Pesquera Andaluza = Localization System of the Andalucian Fishing Fleet

thorough description and analysis of the projects presented and the views of the main groups involved, summarized in the following points:

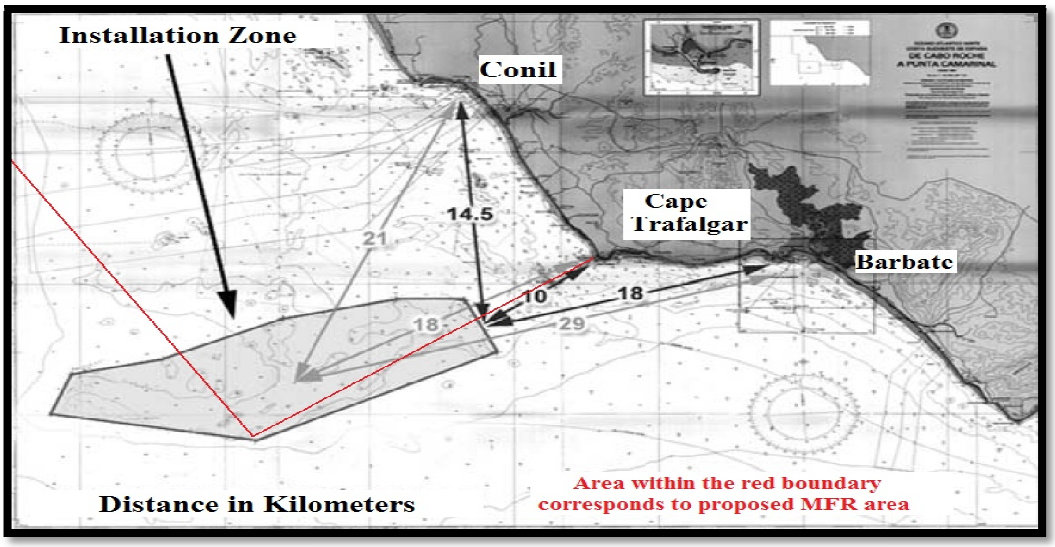


Figure 16. Edited map taken from Bejarano (2006) showing proposed location for the 'Sea of Trafalgar Project'.

Proposing Companies: A total of four different projects have been proposed in the zone west of the Cape of Trafalgar, between 5 to18 km from the coast, the localization being based on the ideal strong winds and medium depths, allowing installation with low visual impacts. Benefits presented include production of clean energy, provision of artificial reefs as new breeding grounds, new job opportunities for nearby communities (attractive in these high unemployment rate regions), protection of traditional fishing grounds, interference with trawling grounds and linked aquaculture, hydrogen production, modernization (laboratory, port facilities) and culture/heritage related ventures. As for impact assessments these vary from one project to another, however generally certain effects are still doubtful, some are justified by counter parting advantages and others are said to be justified by technological advances lowering impacts (Florido del Corral, 2005). The impact assessment of the 'Sea of Trafalgar Project' for instance, concludes that negative impacts include: sedimentation planned to be minimized through the use of an innovative system of floating platforms and automatic anchorage systems, said to be a less environmentally-aggressive option; effects on nectobenthic communities; doubts of effects on pelagic fish species, mammals and turtles[28]; visual and underwater noise impact and the modification of a specific navigation route. Migration of tunids and almadraba catches, will supposedly not be effected due to permeability offered by the distances between the individual wind turbines and the fact that

[28] The study by Madsen et al. (2006) concluded that noise impact on marine mammals is more severe during the construction of wind farms than during their operation and that impact zones for marine mammals from operating wind turbines depend on the low-frequency hearing-abilities of the species in question, on sound-propagation conditions, and on the presence of other noise sources such as shipping. Impacts and mitigation efforts are still areas which need to be studied deeply.

the majority of the almadraba catches (70-80%) are derived from tunids travelling along routes parallel to the coast rather than those moving perpendicularly from the Atlantic Ocean towards the coast (Figure 17.) (Bejerano, 2006).

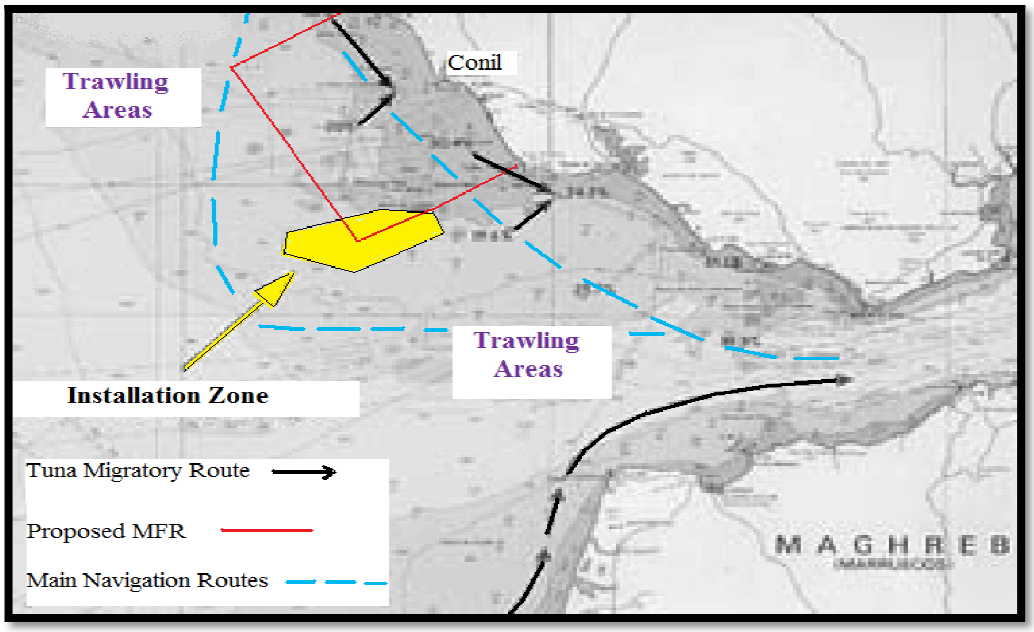


Figure 17. Edited map taken from Bejarano (2006) showing the proposed location for the 'Sea of Trafalgar Project' in relation to important routes and reference points

Ecologists: Whilst linked aquaculture projects have been given the cold shoulder by some NGOs as is Greenpeace, generally involved green groups as Greenpeace and *Ecologistas en Acción* took a global standpoint and acknowledged the important role of offshore wind-farms in clean energy generation and the negative image these have received by social and political groups based on exaggerated facts of impacts whilst condemning the opportunistic political games surrounding themes of such importance (Ecologistas en Acción , 2009 & El Pais Andalucia, 2004). The danger of such projects being subventioned and promoted through the approach of economic expansion rather than control of energy production and consumption, is highlighted. On the other hand, another NGO (Agaden), took a local standpoint and presented an assessment enlisting impacts including: dredging impacts on protected species (coral and seagrass meadows) and effects on sediment dynamics and of electromagnetism on tuna migration (following experienced impacts of the installation of a submarine cable in the Straits of Gibraltar, on other fisheries). Other reasons against the wind farms include the presence of protected figures in the zone, as are the Natural Park of la Breña and the Isthmus of Trafalgar (Florido del Corral, 2005).

Fishermen: This group started up an initiative named 'Committee for the defence of traditional fishing activity, No Wind-farms here!' Opposition by this group, apart from supposed impacts on fish populations, considering the specific local ecological characteristics, include: the alteration of navigation routes. Interestingly, and rightly so, this

group proposed that environmental impact assessments were carried out from independent bodies (Florido del Corral, 2005).

Other local groups: Tourist businesses, surf clubs and other local groups, emphasize the visual impact on the environment considered as natural heritage which should go untouched. Justifications include examples of visible existing landmarks at similar distances as those of the projected wind turbines (Florido del Corral, 2005).

So far neither project has been confirmed, however the situation remains tense as wind-power gains support (despite definite decisions remaining ambiguous) over touristic expansion, by central authorities, regional councils and socialists, based on global clean-energy and sustainability tendencies (aiming at CO_2 emission reduction). Meanwhile local opposing parties (mainly the PP (Partido Popular)) are defending the citizens` views (PP-Barbate, 2010). The innovative 'green and clean' nature of wind-farms, exploited at a large scale by multinationals throws these structures in the grey zone and the uncertainties tied to their possible impacts, the pressure by opposing groups, together with the fact that improvements are still in a development stage, makes the task of deciding on their real nature, a hard one. Whilst the decision will finally be taken by higher authorities, future MFR managers should formulate an opinion with respect to this theme, and bear in mind possible overlap of the protected area with the installation zone of the wind-farm project, together with potential conflicts that could surge and ways of mitigating them.

5.3. The Matter of the Bluefin Tuna

In the world of fisheries, *Thunnus thynnus*, is definitely one of the most talked about specie in the last years. This species has been commonly sought by various Atlantic and Mediterranean fishing communities coinciding with its migratory route, and in areas as Andalucia techniques as the almadraba, developed for the selective capture of this species, boasts of at least a 1000 year history (Roldan Muñoz, 2009). However reduction of catch sizes and numbers and numerous reports of illegal operations revolving around this species (Figure 18.) has fired the state of alarm surrounding the industry.

How such a long-standing tradition suddenly looses base and resources are suddenly found in an over-exploited state is very often explained by the shift of fishing practices from methods referred to as 'artisanal' (as is the almadraba) specifically targeting populations migrating from the Atlantic to the Mediterranean, to a more industrial kind, as are purse seiners (occasionally aided by silent light aircraft) used to catch large numbers (usually during their reproductive stages[29]) for fattening, in a highly indiscriminate manner (Roldan Muñoz, 2009). This stronger fishing effort has been encouraged by the high prices that exemplars of this species especially reach in Japan, being used in the now globally popular sushi cuisine.
In response to this situation, in 2006 the ICCAT (International Commission for the Conservation of Atlantic Tunas)**,** an inter-governmental fishery organization responsible for

[29] The purse seining movement now states that video registered studies have shown that reproduction is not inhibited when the fish are passed from net to cages. (Martinez-Conde Revuelta, 2009)

the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas, adopted a Recuperation Plan, and in 2007 the E.U. started to apply provisional rules (Roldan Muñoz, 2009). During its most recent reunion, at the end of 2009, in Brazil, the ICCAT recommended a significant reduction of the TAC for Bluefin Tuna and it has called on Spain to slash its national fishing quotas by 40% : from 4,116 tonnes to 2,523 tonnes (EFEAGRO, 2010).

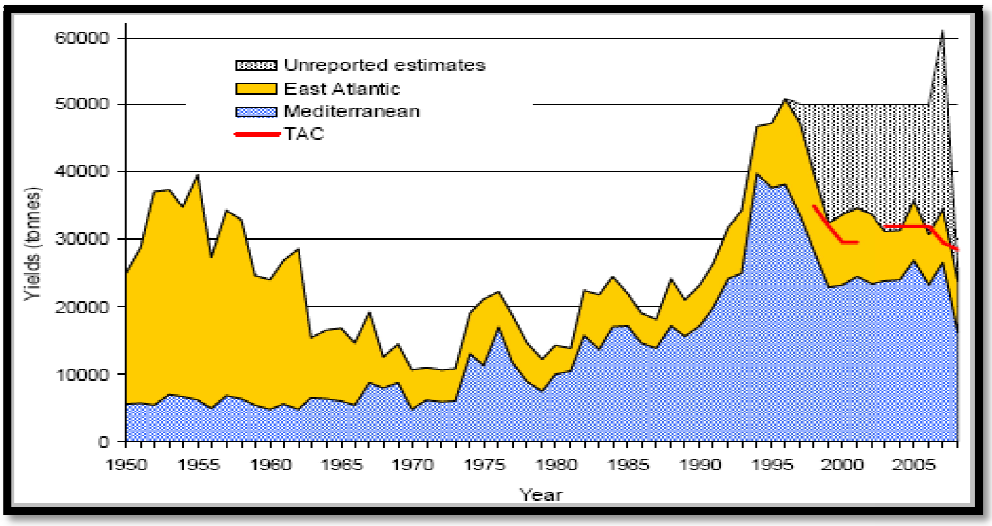


Figure 18. Reported annual catches for the East Atlantic and Mediterranean from 1950 to 2008 split by main geographic areas (ICCAT, 2009)

In sight of this threat, THE OPP-51 (Organización de Productores Pesqueros de Almadraba Organization of Almadraba Fishery Producers) supported by local councils of the villages concerned have been pressuring the Ministry of the Environment and Rural and Marine Affairs (MARM), to prioritize the almadraba over purse seining in the distribution of quotas. Their argument is supported by the following facts: the almadraba is responsible for 80% employment and 20% of captures, whilst purse seiners are responsible for 20% employment and 80% of captures. Infact one almadraba employs as many people as 6 purse seiners. Additionally the almadraba is supported by a long history of sustainability and cultural significance (Roldan Muñoz, 2009). Talks between the OPP-51, MARM and the Andalucian Regional Council have resulted in positive results for the organization with proposals for the almadrabas to be recognized as 'scientific observatories' for studying the state of the Blue Fin Tuna and presenting results infront of ICCAT. Another line of action will be the modification of a rule that prohibits quota transfers between fleets operating with different techniques. Through such adjustments, almadraba fleets of the Cadiz province may be passed on quotas owned by Mediterranean Catalan purse seining fleets which will be in turn be compensated through permits to market other species. Therefore almadraba activities are likely to be given a go-ahead for 2010 in favour of other fleets a decision which has started a war between the two fleets (EFEAGRO, 2010).

However the rope is being pulled by more than two sides, and at another end NGOs as are Ecologistas en Acción, Greenpeace, MarViva, Oceana, Pew and WWF have together signed a petition in favour of the prohibition of the international commerce of Blue Fin Tuna and its inclusion in the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) Appendix I, under which are listed the most endangered species (Ecologistas en Acción , 2010a). This would limit the commerce of tuna within European frontiers, excluding Japan from the game. This proposal has also been backed by the European Parliament and will be suggested during the 15th meeting of the Conference of the Parties to the (CITES), to be held in Doha (Qatar) in March 2010, under certain conditions, including the allowance of traditional coastal artisanal fishing (as the almadraba) to continue, financial support for affected seafarers and vessel owners and tighter controls and penalties to control IUU (European Parliament, 2010). It has however been met with great disapproval by fishing groups as is CEPESCA (Spanish Fishing Confederation) stating minimum requisites of the CITES Appendix I are not met and emphasizing the importance of international trade to the economic feasibility of the industry categorization, giving rise to another collision between ecologists and fishermen (EFAGRO, 2010a).

Whilst the aim here is not to take sides in the almadraba-purse-seining or ecologist-fishermen battles (despite the future responsibility of the management team to take a stand-point with regards to such issues), awareness of the current situation is fundamental as, in the case that this traditional technique survives, its integration within the MFR project must be considered, its grounds being situated within the MFR area (Figure 19).

5.4. Open-sea Aquaculture

Aquaculture nowadays represents an almost definite present or future opportunity for many coastal civilizations, holding a more important role now that the fishing sector is facing so many obstacles. And this is of no exception in the province of Cadiz and Conil. Following the project named **'Project for the development of floating artefacts and experimentation of cages for the culturing of fish in open sea'**, which took place between 2000 and 2003 close to the coast of Rota (north of Conil), focussing on the testing of innovative technologies, the projects listed in Table 6 were realized in Conil. Here aquaculture experiments and farming are of the 'offshore' kind, being situated at 6 Km from the coast and cover an area of 312,000 m^2 (Junta de Andalucia, 2010a).

Table 6. Aquaculture-linked projects in Conil de la Frontera (References: Junta de Andalucia, 2010a, Padilla, 2010 & Acuicultura Integrada, 2010)

Project Name and details	Description	Results/Conclusions
'Viability Study of Cultivation of New Species in Floating Artefacts in Open Sea' **2003-2006** Promoted by the Department of Fisheries and Aquaculture of the Ministry of Agriculture and Fisheries of the Andalucian Regional Council with the participation of the Institute of Agrarian and Fishery Research and Training of the Regional Ministry of Innovation, Science and Business and funded by E.U. funds (IFOP).	Experiments in open-sea installations consisted of (i) cages for the cultivation of the Common Seabream (Pargo-Bocinegro), the Gilt-head Seabream (Dorada), the Rubberlip Grunt (Borriquete), the Common Sole (Lenguado) and the Redbanded Seabream (Hurta/Urta). (ii) long-lines for the production of oysters (ostiones), scallops (vieiras and zamburiñas) and mussels (mejillones). On the other hand feed trials and pre-fattening and fattening stages took place in the installations present at the port of Conil itself.	**Environmental monitoring results:** Small and insignificant changes in nutrient concentrations or grain size were linked to fractions of sand and gravel rather than finer particles revealing the important role of the high energy hydrodynamics in the area. No changes in benthic biodiversity. Redox potential variations were linked to proximity of cages to the bottom and grain size; and were low above sea-bottoms characterized by large grain size. Anchoring procedures were observed to result in furrows of 5-6 m of length with little effect over the biota and fast recuperation. Very low variations in the water column oxygen concentration owing to the high rate of water renovation in the area. **Technical results:** Information related to management plans, human resources and material, new equipment tried and tested, cultivation of 7 species **Oceanographic data:** Significant wave height: 6.2m Currents: 84cm/s **Characterization of biological parameters**: growth periods, degree of adaptation to the off-shore conditions, profile of fatty acids and adaptation to feeds and structures

Project Name and details	Description	Results/Conclusions
'Viability of Culturing in Open-sea by Fishing Professionals' and **'Project of Integration of Fishing Sector in Open-Sea Aquaculture'** 2006-2008 Presented by the Cooperative of Conil to the Department of Fisheries and Aquaculture of the Regional Ministry of Agriculture and Fisheries of the Andalucian Regional Council	Application of data from previous experiments, selecting most successful and efficient systems (Sea System cages and long-lines) and species with best growth rates, resistance to local conditions and affordable eggs or larval stages. Objectives: Integration of fishing sector Implementation of training programs Testing suitability of fishing boats to project Implementation of economic efficiency System consolidation to serve as reference for future projects.	**Project expansion, final results:** 25 long-lines for mollusc cultivation, 4 cages for fish cultivation and pre-fattening of molluscs in port (re-situated for stress reduction) Construction of port quarters as administrative, storage, packing, distribution and research centre. Job distribution Testing of adequacy and adaptation of vessels used in aquaculture operations through addition of gear and equipment. 2- month theoretical/practical course directed to fishing sector organized by Public Enterprise for Agrarian and Fishery Development and Cooperative **Conclusion:** Compatibility of fishing sector and vessels with aquaculture-related tasks, with certain limitations detected and the need for firm investments for consolidating this activity
Suspended longline cultivation of oysters and macroalgae associated with cultivation of the European Seabass (Lubina) in open-sea cages. This forms part of the pilot studies of Multitrophic Cultivation (2008-2011) of the National Plan of Marine Cultivation JACUMAR (Integrated Aquaculture) directed by the Department of Fisheries and Aquaculture (Regional) and the Public Company of Agricultural and Fishery Development	Experimentation of growth variations vs. location changes of oyster and macroalgal long-lines with respect to Seabass cages. Throughout the experimental period a series of biological, environmental and economical analysis are being carried out.	Study in process

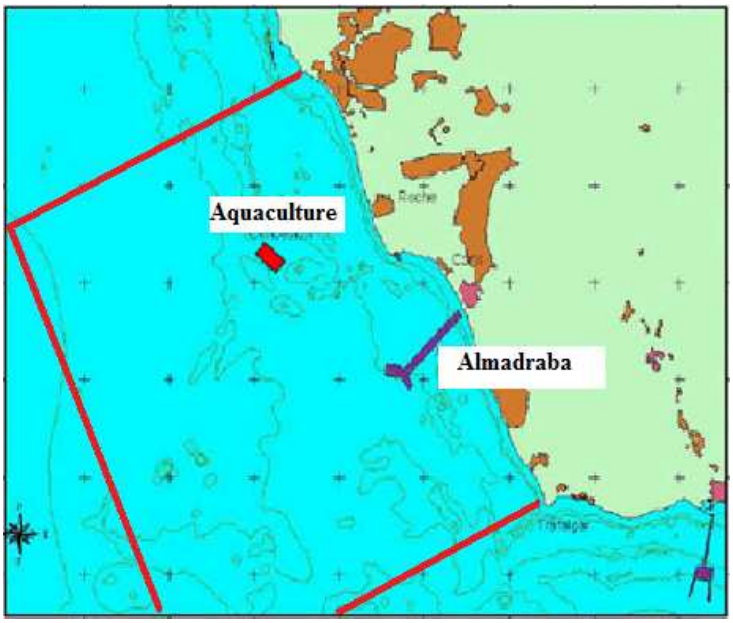


Figure 19. Aquaculture and almadraba installations located within the reserve area (Map copied and elaborated from Junta de Andalucia (2010))

This combination of initiatives may be considered pioneering at a European scale, both for being of the offshore kind having advantages as reduced visual and environmental impacts, reduced maintenance, increased cultivation loads and reduced growth time due to high frequency currents and more stable cultivation conditions, as well as for being a means of integration of the labour and economy of the fishing sector. Meanwhile there are management challenges including: acquiring lower insurance prices considering that the submerged structures used are less vulnerable to damage, proving viability of higher stocking densities, acquiring fee reduction for greater area requirements, avoiding maritime traffic and improving marketing under the name of 'offshore products'. Meanwhile manufacturing and administrative sectors are facing financial and demand problems, limiting development of technology for larger scale research projects and risking the transfer of such ventures to private farms, the results of which would not be directed to the public sector (Padilla, 2010).

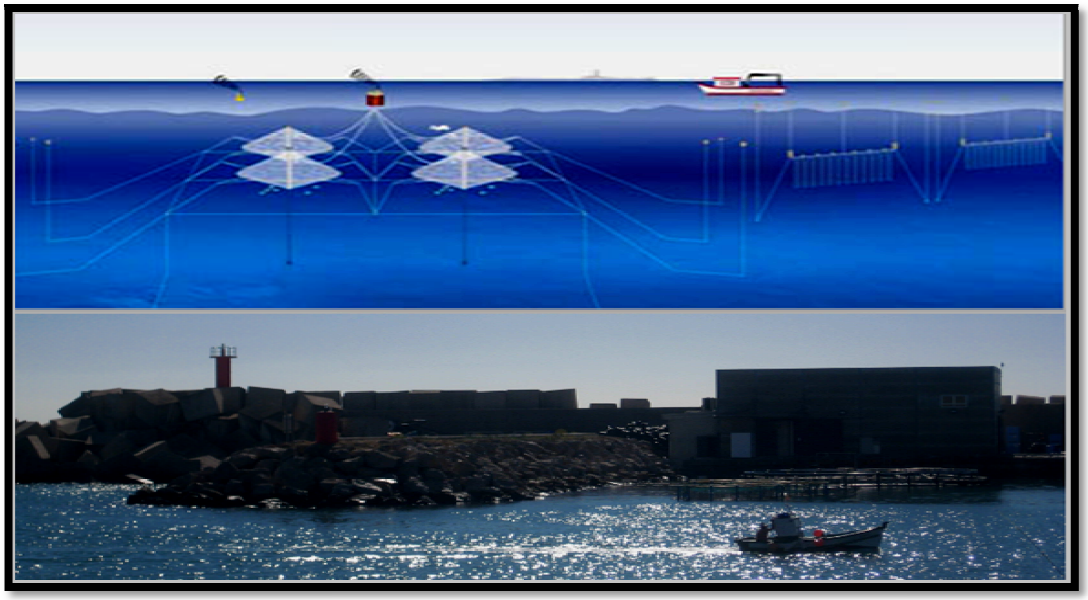


Figure 20. Aquaculture instalments and facilities out at sea (farming with cages and long-lines) and in port (pre-fattening, storage, laboratories etc.) (Reference Junta de Andalucia (2010a) & own photo)

With respect to the MFR, compatibility between this proposal and future plans of farming projects must be confirmed due to territory overlap (Figure 19). According to experiences within Os Miñarzos, where aquaculture plants are found on land, coinciding MFR and aquaculture plans have helped to carefully consider environmental criteria, which might have been given secondary importance had the MFR not existed (Gomez Blanco, 2009).

Whilst some suggest that farming reduces pressure on wild-stocks, others emphasize environmental impacts as are: a net food loss (in systems where the weight of fish used for feeding is greater than that produced), extraction of marine species from oceans including wild juveniles vital for future stock growth, release of organic waste and toxic effluents and fear of alteration of the wild gene pool in case of escapes. Meanwhile sustainability is highly dependent on the kind of aqua-culturing system developed and is more likely when chances of the mentioned risks and problems are reduced. If we take the greenest of guidelines for sustainable farming the criteria include:

- use of plant-based feeds and elimination of fish-meal or fish-based oil;
- not using wild-caught juveniles;
- cultivation of species that are native in open-water systems;
- no negative environmental impacts in terms of discharges and effluents;
- no negative effects to local wildlife;
- no genetically engineered fish or feed;
- stocking densities that minimise the risk of disease outbreaks and transmission;
- no depletion of local resources, for example, drinking water supplies;
- no threats to human health;
- support of the long-term economic and social well-being of local communities.

(Greenpeace, 2010).

Whilst measuring the sustainability of the aquaculture systems at Conil is not the target here, the stated low environmental impacts (Table 6.) are appreciable. Additionally Padilla (2010a) explained how conditions at Conil may be approaching such ‘green’ levels owing to the fact that: with time feeds are more soya-based and fish meal comes from fishing grounds (in Peru) which are in process of certification. Also; juveniles originate from hatcheries, species are native, no effluents are discharged in open-sea, no genetically modified organisms are used, and stocking densities and resource use are under control.

However the theme remains open-ended, with an infinite number of arguments, groups and studies supporting or breaking it from all sides. At the least, the aim here has been to highlight the weight of the ‘sustainability’ concept within the aquaculture sector especially one situated within a reserve.

5.5. Fishing Tourism

In the search of innovative strategies to channel a greater income into the industry one option which is currently a popular highlight is that of making good use of the industry`s cultural richness. This tendency has seen the rise of various initiatives which aim at conserving,

revaluing and promoting the heritage linked to the fishing sector whilst simultaneously creating opportunities for economic and professional development of those working in the fishing sector and diffusing knowledge regarding marine-related issues. Since a few years the Regional Ministry of Agriculture and Fisheries of the Andalucian Council has participated in such initiatives through European programs supporting transnational collaboration as is INTERREG III-B Mediterraneo Occidental with the financial support of FEDER funds for the fulfilment of projects as are the following (Junta de Andalucia, 2010b):

- MARIMED which targets a stronger integration between the fishing and sustainable tourism sectors through the collaborative participation of a number of public and private Italian, French and Spanish bodies. Activities include projects of the promotional-artistic kind (exhibitions, cinema, etc.), research about the attractive potential of the sector and pilot projects all with the aim of activating innovative processes of sustainable fishing tourism (MARIMED, 2010).
- THON.DOC targeting the elaboration and experimentation of an innovative touristic program based in the exploitation of the cultural heritage and of the environment which is related to ancient Mediterranean traditions tied to tuna fishing (THON.DOC, 2010).
- ANDANATURA Projects: 'Dynamizing traditional fishing through new touristic activities favouring the sustainable development of Natural Protected Areas' through which pilot studies of fishing tourism were carried out in the ports of Isla Cristina and Tarifa (ANDANATURA, 2010)

In these regards Conil de la Frontera, being one of the main almadraba villages and holding various spots of interest in this context (museum, lighthouse, towers, fishing port, restaurants etc.) holds an important position in such ventures and the Cooperative has already been participating in studies as those under the SAGITAL project (in collaboration with THON.DOC) aimed at formulating strategies of adaptability of the fishing sector, businesses and workers to new activities and developing appropriate supporting tools and management (THON.DOC, 2010). In the meantime, within the province, results are already evident as is the appearance of the Almadraba Tuna Interpretation Centre in Barbate which organizes informative workshops and trips to the village`s almadraba fishing grounds (Junta de Andalucia, 2010).

And opportunities for further action of this kind exists through other programs as is the case of the multilateral cross-border cooperation "Mediterranean Sea Basin Programme" which is part of the new European Neighbourhood Policy (ENP) and its financing instrument-the European Neighbourhood and Partnership Instrument (ENPI)-for the 2007-2013 period. It aims at reinforcing cooperation between the European Union and partner countries in regions placed along the shores of the Mediterranean Sea and there maybe prospects of projects related to the fishing sector (also involving the Cooperative of Conil) under this framework (ENPICBCMED, 2010).

5.6. Bibliography

Andanatura (2010) La Fundación Espacios Naturales Protegidos de Andalucía [online] Available at: www.andanatura.org Accessed on: 10/02/10

Aquicultura Integrada (2010) Plan Nacional de Cultivos Marinos JACUMAR [online] Available at: http://www.acuiculturaintegrada.com Accessed on: 24/02/2010

Berejano (2006) Advances of environmental impact assessment of the project of take advantage of the natural resources "Sea of Trafalgar". Informes de la Construcción, Vol. 58, 504, 5-18

Boletin Oficial de la Junta de Andalucia (2003). Boletin Numero 248 de 26/12/2003: DECRETO 361/2003, de 22 de diciembre, por el que se regula la pesca marítima de recreo en aguas interiores. [online] Available at: http://www.juntadeandalucia.es/boja/boletines/2003/248/index.html Accessed on: 25/02/2010

Ecologistas en Acción (2009). Rechazo a la "demonización" de los parques eólicos marinos. [online] Available at: http://www.ecologistasenaccion.org/spip.php?article15248 Accessed on: 18/10/2010

Ecologistas en Acción (11 February 2010) [pers.comm.] Email to members

Ecologistas en Acción (2010a). Manifiesto por el atun rojo. [online] Available at: http://www.ecologistasenaccion.org/spip.php?article16571Accessed on: 18/02/2010

EFEAGRO (2010). El MARM y la Junta de Andalucía llegan a un acuerdo para garantizar la actividad de las almadrabas [online] Available at: http://www.agrovia.com/pesca/maritima/marm-junta-andalucía-llegan-acuerdo-garantizar-actividad-almadrabas/4_32_1181419.html Accessed on: 18/02/10

EFEAGRO (2010a). Los armadores rechazan el veto al comercio mundial del atún rojo y alertan sobre sus consecuencias. [online] Available at: http://www.agrovia.com/pesca/comisión-europea-propone-vetar-comercio-internacional-del-atún-rojo-año-plazo/4_2921227_1215575.html Accessed on: 27/02/2010

El Pais Andalucia (2004) El Parque Eólico Marino en Trafalgar: torres eolicas en el mar, centro eolico en caños de meca [online] Available at: http://www.placerdetrafalgar.com/parque-eolico-marino-trafalgar.html Accessed on: 18/02/2010

ENPICBCMED (2010). Cross-border Cooperation in the Mediterranean. Available at: http://www.enpicbcmed.eu/ Accessed on: 24/02/2010

Europa Press (2009) Agricultura es galardonada por el Sistema de Localización de Embarcaciones Andaluzas. Europa Press. 14 November 2009 [online] Available: http://www.europapress.es/economia/noticia-agricultura-galardonada-sistema-localizacion-embarcaciones-andaluzas-20090113122542.html Accessed on: 25/11/2009

European Commission (2010) Combating Illegal Fishing [online] Available at: http://ec.europa.eu/fisheries/cfp/external_relations/illegal_fishing_en.htm Accessed on 10/02/10 Accessed on 11/02/2010

European Parliament (2010). Key objectives for the Conference of the Parties to the CITES Convention (Doha, Qatar, 13-25 March 2010). [online] Available at: http://www.europarl.europa.eu

Fernandez Muñoz, N. (2009). Manipulación y Conservación de Productos Pesqueros y Acuicolas. Presentation at University of Cadiz.

Florido del Corral, D. (2005) Los Molinos de Viento de Trafalgar. Paradojas, Ambivalencia y Conflictos Respecto a las Relaciones Humano-Ambientales en el Sur de Andaluci. In: Pascual, J. and Florido del Corral, D. (2005). ¿Protegiendo los Recursos? Áreas Protegidas, Poblaciones Locales y Sostenibilidad. Sevilla, España. Fundación el Monte. p. 209-242.

Florido del Corral, D. (2007). Challenges and responses in fisheries management systems. The case of artisanal fleets of the Atlantic coast of Andalucia. In: Rubio-Ardanaz, J.A. & Erkoreka, A. (Eds). Cultura y Sociedades marítimas: praácticas especificas, sistemas técnicos, sociales y de representación. Zainak. 29, 2007, 101-122.

Gomez Blanco, J.M. (9 October 2009) [pers.comm.] Email to S. Camilleri
Greenpeace (2010). Sustainable Aquaculture. [online] Available at: http://www.greenpeace.org/international/campaigns/oceans/sustainable-aquaculture Accessed on: 23/02/2010

ICCAT (2009). Report of the Standing Committee on Research and Statistics (SCRS). Madrid, Spain, October 5-9, 2009.

Junta de Andalucia (2010) Atun de Almadraba Centro de Interpretacion Available at: http://www.atunalmadraba.es/es/index.asp Accessed on: 24/02/2010

Junta de Andalucia (2010a) Experiencias de Acuicultura en Mar Abierto en Andalucia. Available at: www.acuiculturaenmarabierto.com Accessed on: 22/02/2010

Junta de Andalucia (2010b) Pesca Turismo: Web de Turismo y Patrimonio Pesquero. [online] Available at: http://www.rutasturisticopesqueras.org/ Accessed on: 24/02/2010

Madsen, P.T., Wahlberg, M., Tougaards, J., Lucke, K. & Tyack, P. (2006) Wind turbine underwater noise and marine mammals: implications of current knowledge and data needs.

Marine Ecology Progress Series. Vol 309, p. 279-295.

MARIMED (2010) Fishing industry as a means of developing sustainable tourism. Available at: http://www.euro-marimed.org/en/index.htm Accessed on: 24/02/2010

Marine Conservation Biology Institute (2005) What is a Bottom Trawl. [online] Available at: www.mcbi.org Accessed on: 11/10/10

Martinez-Conde Revuelta, F. (2009) Las redes de desinformacion. Apicius. Quaderno No.13. [online] http://www.apicius.es/index.php Accessed on: 27/02/2010

Noticias Juridicas (2010) Base de Datos de Legislación: Orden ARM/2515/2009 [online] Avaliable at http://noticias.juridicas.com/base_datos/Admin/o2515-2009-arm.html Accessed on : 12/02/10.

Olmo Garrudo, L.A., Fernandez Cortes, J. & Cores Prieto, F.J. (2006). Sistema de Localización y Seguimiento de Embarcaciones Pesqueras. TechniMap,Sevilla, 2006.

Padilla, F. (2010). Planning, Regulation and Management in off-shore aquaculture: Experience in the South of Spain . Presentation for Offshore Aquaculture Technology Platform, 2007, Dublin.

Padilla, F. (10th March 2010a) [pers.comm.] Email

PP-Barbate (2010). El PP aboga por diversificar la economía de la Janda tras el fracaso de los planes anticrisis y la crisis de la pesca y las almadrabas. [online] available at: http://ppbarbate.wordpress.com/ accessed on: 18/02/2010

Roldan Muñoz, A. (2009) Defender las Almadrabas. La Voz Digital. 16 December 2009 [online]. Available: http://www.lavozdigital.es/cadiz/prensa/20091216/opinion/defender-almadrabas-20091216.html [Date Accessed: 17/01/10]

Various Authors (2001) Las Artes de Pesca en el Litoral Gaditano. Diputacion Provincial de Cadiz, Cadiz.

THON.DOC (2010) Valorisation du Patrimoine Culturel Transnational du Thon dans la Méditerranée Occidentale [ONLINE] Available at: http://www.thondoc.ntua.gr/index_EN.html Accessed on: 24/02/2010

CHAPTER 6

CONCLUSION

6.1. Final Reflections

When studying a community and system, as the one of Conil de la Frontera, which is already backed by years of fishing-related activity, the first question which comes to mind is: Why a MFR now? Such official figures of protection seem to function, in the contemporary world, as reliable reference points collecting fixed ideals and related groups/stakeholders. This 'officialization' effect in return facilitates the enforcement of regulations, the acquisition of funds and support through stronger links with other administrative levels and the communication/ educational process through stronger links with other stakeholders. The need of such figures is the result of a greater level of anthropogenic activity and competition around the coastal zone; and the need of communities who have been based in such zones for long enough, to come together and reclaim what they feel should be protected. Meanwhile the bottom-up approach is an attempt to convert conventional linear systems, where management initiatives are transferred from one end to another with the risk of losing effectiveness along the way; to a more circular system in which all levels hold a more equal level of importance.

The analysis of the management process underlying this 'officialization' process, incites the criticism of the perceived system, with special attention to the fishing sector, this being the focal point within this bottom-up approach in this case. Such constructive criticism is hoped to serve for the sector to develop, evolve and improve.

Insecurities within the sector were found to be mainly based on knowledge gaps with respect to technical and legal aspects within a MFR system, revealing the existence of challenges as are (i) the need of greater integration and sharing of territory and responsibilities with other stakeholders, out at sea and in the administrative field and (ii) a context of greater 'internationality' of various themes tied to the sector, whereby, due to the importance or complication of issues, fundamental decisions lie in the hands of European or International level decision making groups, as is the case of the Bluefin Tuna. With respect to this 'internationalization' factor, it will be interesting to see how the new Common Fisheries Policy will influence at local levels.

An important tool to support the sector through adapting and updating in such a scenario is a broad-ranged training process tackling practical, psychological and philosophical/ethical aspects; as role-shifting requires both technical but also mental preparation. This is especially so in the case of bottom-up management where more responsibilities are supposedly passed to the fishermen. This must be seen as a step-by-step evolutionary process and so the habit of informative training and discussion sessions is ideally well consolidated so that the MFR Committee is, as much as possible, a strong team ready to deal with up-dates and changes. The positivity of the sector towards initiatives held so far, whilst being encouraging, must be maintained actively. Additionally experience elsewhere can provide guidelines; while adapting procedures to the specific site and case. In this respect the establishment of monitoring programs to evaluate performance and results is vital.

In addition to training, other realistic dimensions must not be omitted and so the MFR Committee must always seek the necessary financial, legal and political support. A management team containing a diverse range of qualities and contacts is important in this aspect.

Experts supporting the fishing sector in mapping/zonation plans must organize a plan of collection of ecological information based on what exists and what doesn`t and modern tools as is GIS and others should be taken advantage of. Schedules should ideally follow natural patterns which favour this data collection process. Whilst investment in the collection of data (technical/technological/scientific) which can support zonation related decisions, is important, in the meantime design and implementation must rely as best as possible on what is currently available, whilst highlighting gaps and working on filling them, a strategy termed as adaptive management. To all this, ecological processes outside the reserve must not be omitted as boundaries are finally only lines on paper. Thus managers must be conscious of issues outside the reserve which might be important influences and consider them within plans and proposals. These might include issues out at sea, along the shore, or inland. This brings us to re-consider the importance of the size and span of an MFR, and the utility of buffer zones and network creation.

A further insecurity which may perturb the development and success of a MFR is the mistrust and scepticism towards stakeholder of various levels. To mitigate mistrust and conflict, efficient representation of various groups within the MFR Committee is fundamental as this promotes better understanding, collaboration and democracy. This is especially relevant to other users of the physical territory considered as are recreational fishermen and almadraba representatives, but is also the case for authorities at regional levels; NGOs, researchers and other groups whose ‘whistle-blowing’ role is fundamental. Where representation is not possible efficient communication should replace. This may be the case with Cooperatives or organizations from neighbouring areas possibly affected by decisions imposed within the reserve area.

To not be excessively idealistic, the complexity of the situation must be comprehended: it is a scenario within which stakeholders are ever more numerous. Additionally within a process lead by the fishing sector, the level and point of inclusion of other groups is a greatly disputable (and possibly alarming) subject. This debate is especially real nowadays when we consider that Cooperatives may be feeling threatened by other administrations and groups (the case of the Bluefin Tuna is once again a clear example). Within this context the bottom-up approach must empower the sector without letting it take a too much of a subjective approach as this might be the cause of further conflicts in the future. Younger generation fishermen may play an important role in the revolution of thinking towards other groups and better collaboration may be established. They are thus vital within conflict prevention and mitigation strategies.

Another weak base of the sector lies in the history of ‘economical’ struggle (despite Conil having survived well enough), for which the design of intelligent marketing strategies must

be kept a priority, a task which is as complex as ever within a 'liberalized market' scenario. This subject, although always kept present, has been one the least discussed and analysed here; owing to time, space and knowledge limitations and deep study and reform suggestions are encouraged.

On the other hand, within the new MFR scenario, the sector is strengthened by other factors. One of them is the traditionality and familiarity from which originates unison and interest to work for improvement of the industry. This is especially valid in the present situation of poor economic and ecosystem sustainability, where the urgency of the situation, may (hopefully) give rise to positive tendencies, as the greater interest to collaborate in new and alternative ventures. This quality is also what keeps cultural values alive, a kind of heritage that is gaining in value and that can be a key to gaining funding access and support by other groups.

Another strong point is that within a bottom-up managed system the 'local ecological knowledge' of the real hands-on workers of the field is given recognition. Moreover the fishing community of Conil has shown to have a great sensibility towards the surrounding environment. This point must also be brought across to other groups as in general the fishing community has always had a negative reputation with respect to environmental issues. It is fundamental to understand that day-by-day realities of the fisherman might be limited by financial, social or bureaucratic factors. Stereotype ideas of this group, and also of others must not interfere in the way of an efficient work force. This idea is supported by the surging trend of cultural activities acting to bring the fishing community closer to the rest of society. Additionally there is a considerable level of sympathy from part of certain local NGOs and researching groups towards the fishing sector.

As for the Stakeholder Analysis, the benefit of this lies in uncovering historical patterns and current trends which shape the character and inter-relations of stakeholders, and that should be taken into account by decision makers within the MFR. We here witness the presence of an artisanal fisherman who has had to succumb to external pressures, as the top-down and rigid character of the European government and the presence of bigger fisheries groups, and choose to alter his artisanal ways in order to survive in this modern day global context. Being aware of this context, we realize that institutional organization and frameworks might require a certain re-shuffle to adjust to a new system of responsibility distribution, and the MFR Committee might play an important role in proposing how such re-shuffling should take place. Links with neighbouring MFRs or MPAs are useful in this aspect as well as for gaining social, legal and political support. Also, the possibility of the inclusion of further new stakeholders within the management process must never be omitted.

Meanwhile the study points out at lines of work which should be given special care and that would in turn increase the trust and communication between the MFR Committee and other authorities.

One of these is the theme of illegal fishing activities. Whilst experts and experience from other case studies may act as references, every story is individual. Decisions taken at Os

Miñarzos, where underwater fishing and angling (contributing groups to illegal fishing) were treated differently, with only the latter being permitted; are not necessarily translatable in Conil. Additionally the key question; of the real impacts of 'recreationals', when compared to impacts by other users; should not go forgotten. However, despite their lower impact, their 'recreational' status still makes their role a less established one when compared to professional fishermen. Also, the fact that underwater fishermen in Conil are not represented by any organization puts this group in a fairly risky position.

When possible, regulations must be as little exclusive as possible. Creativity may be able to convert problematic relations into cooperation. With respect to underwater fishermen; their capabilities and knowledge of the sea can be made use of within the reserve system; for instance through the organization of data collection campaigns encouraging the use of alternative practices as is underwater photography, or through action campaigns for sea-bottom cleaning. Besides groups as this one are important indicators of additional threats to fishing grounds. Threats mentioned, as ghost-fishing and pollution, must not go ignored as the ecosystem must not only be protected from overfishing.

With respect to pirate activities from proper fishing vessels or with proper fishing tackle prohibition must be backed by information campaigns and reporting/control system must be activated by team effort in which all users on field must participate. Familiar links must stop being an excuse for allowing illegal actions; instead achievement of the benefits of the reserve must be mentalized as a collective attempt of which everyone must feel part of. Certainly someone will always fall victim to the modern syndrome of rule & regulation-needs, for which decisions must be well communicated, explained and justified.

The study also exposes the presence of novel activities along the coast of Conil. Different activities of these types have different statuses, with economic benefits and environmental sustainability being the weights determining their success and acceptance.

The almadraba, the activity with the strongest cultural ties, is locally protected and supported, something which might even save it from regulations which will be harder on the fates on other tuna-capturing techniques. Its economic sustainability in a new possible context of banned international trade is however put into question. Meanwhile the creation of an MFR around its fishing grounds may add to its fame and further positively popularize its status. Aquaculture and tourism related activities, already backed by research and pilot studies, may be a significant part of the fishermen`s life in a future MFR for which monitoring and evaluation of the integration process of these activities is essential. In the case of success, projects may be transferred to other fishing ports and communities in the area. And finally offshore wind farming, despite being strongly criticized from a local-point of view and in spite of doubts regarding their real impacts, may be strongly favoured owing to their 'clean energy' status. Even though decisions regarding the realization of such projects may be beyond the control of MFR officials, they should still be carefully contemplated, especially in the case of territory overlaps of such projects with protected zones; and decisive stand points with respect to related issues should be taken.

6.2. Applications of study

This study firstly serves as a memoire of activities held around the creation of the MFR in Conil de la Frontera. Collections of event information are important in the formation of a portfolio of the MFR project. This is especially important in the field of bottom-up managed projects, which are still relatively limited, or still in an experimental phase, and about which there is still a big data gap.

This study additionally aims at serving as a useful guide, with its limitations, to future managers, collaborators, investors and other participants within the MFR area by offering a general, up-dated overview of the present situation in the port area; as well as at an administrative and legal level. Users of this guide must of course be aware of the fast-changing status of certain themes explored here, and the need of updates might, more often than not, be essential.

Contained information may also be used in studies concerning other MPAs and MFRs elsewhere.

Whilst serving the purposes mentioned here above, further studies could dedicate more attention to other aspects within the reserve. Zonation could be analysed deeply from a well studied ecological view-point, the integration process of the fishing sector into new ventures should also be monitored and economic viability of the entire MFR system, with all its running activities and systems must be especially taken care of.